MODEL 101-A

Electronic Services - Los Angeles
M13197X

KAY

Short Form Data

KAY Sweep and Marker Generators

860-H
20 Hz-4 GHz

1500C: The model 1500C is a high performance solid-state sweep and marker system which accepts a variety of sweep and marker plug-ins to cover the frequency spectrum from 20 Hz to 4 GHz. The basic rack unit contains a variable sawtooth sweep generator, birdie and pulse marker controls, and RF output circuits including precision attenuators and built-in detector.

860H: The model 860H includes all of the features of the model 1500C. It is intended for use where the frequency marking is obtained from an external source or counter.

SWEEP PLUG-INS for the 1500C and 860H systems feature: A group of highly stable, low residual audio band modules; extremely flat wide band video, VHF and UHF plug-ins; and a new series of low cost, high output, solid-state microwave devices which extend the range of these systems to 4 GHz.

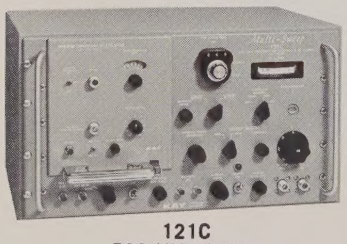
MARKER PLUG-INS for the 1500C include: Model PCM7631, 7632, 7633, and 932 which provide customer specified crystal pulse markers.

Model PCM861 which supplies either single frequency or harmonic birdie-pip markers.

Model PM7670 featuring a completely variable birdie-pip marker *plus* 1 and 10 MHz harmonic markers *plus* a counter output terminal for monitoring the variable mark and pin-pointing critical frequencies.

Frequency Range	Model	Sweep Width	RF Output	FEATURES
20 Hz—200 KHz	PC-141A	0*—20 KHz	1.0V RMS Into 50 ohms	Ultra-stable, Narrow band plug-ins. Crystal-controlled beat-frequency oscillators provide 1.0 V rms output with excellent waveshape. Extremely low residual FM: <0.2 Hz. Drift: <3 Hz/min. Log or linear sweeps.
35 Hz—600 KHz	PC-142A	0*—40 KHz		
100 Hz—2 MHz	PC-130F	0*—2 MHz		Ultra-stable, narrow sweep plug-ins; wide sweeps to 2 MHz. Residual FM: <8 Hz. Drift: <30 Hz/min. Log or linear sweeps.
1 KHz—20 MHz	PC-152B	0*—20 MHz		Wide video sweep plug-in; sweeps from 20 MHz down to less than 1 KHz. Log or Lin sweeps. Spurious beats down more than 30 DB. Residual FM: <150 Hz.
50 KHz—115 MHz	PC-154A	0*—100 MHz		Solid-state wide sweep plug-in; very flat output: ±.25 DB; harmonic and spurious distortions >30 DB down. Residual FM: <100 Hz. Log and Linear sweeps.
1—175 MHz	PC-857A	0*—30%		Ultra stable, narrow band plug-in, very low residual FM.
2—220 MHz	PC-860F	0*—30%		Solid-state, fundamental frequency sweeps to 220 MHz; Twelve band direct reading dial; high output with excellent waveshape. Extremely low residual FM.
220—470 MHz	PC-867A	20 KHz—70 MHz	0.5V rms into 50Ω	Solid-state, VHF-UHF, fundamental frequency sweeps. Excellent waveshape.
Following Models Available for 1500-C, 860-H and 121-C Rack Systems				
100 MHz—1 GHz (Any octave)	PC-123A P-123A	0.2%—octave	0.5V rms into 50Ω	Solid-state octave sweeps to customer specifications. Excellent linearity over full octaves. Stable outputs.
.75—1.5 GHz	PC-120A P-120A	Nom. 0—Full octave	10 MW levelled 13 MW unlevelled	Completely solid-state octave-wide sweep plug-ins; high-level outputs. External or internal pin levelling. Quality not luxury prices; spurious distortion: >60 DB down, Harmonic distortion: >20 DB down.
1—2 GHz	PC-125A P-125A	Nom. 0—Full octave		
1.2—2.4 GHz	PC-126A P-126A	Nom. 0—Full octave	50 MW levelled 70 MW unlevelled	
1.5—3 GHz	PC-128A P-128A	Nom. 0—Full octave	15 MW levelled 18 MW unlevelled	
2—4 GHz	PC-127A P-127A	Nom. 0—Full octave	10 MW levelled 13 MW unlevelled	

* Residual



121C
500 KHz-4 GHz

121C: This solid-state instrument is an electronically swept wide sweep and marker generator which accepts a choice of UHF and microwave sweep plug-ins to provide extended frequency ranges and sweep widths. With its plug-ins, the 121C covers a range of 500 KHz—4 GHz, offers a new series of solid-state microwave sweeps featuring high output at low cost, and accepts a variety of narrow and wide-sweep plug-ins for special applications such as UHF TV.

The basic 121C system includes variable sweep rates, external modulation, CW and manual operation, built-in attenuator and detector plus a fine digital frequency control for smooth center frequency settings and remarkable adjustment during narrow operation.

Frequency Range	Model	Sweep Width	RF Output	FEATURES
500 KHz—1050 MHz	P-121A	5 KHz—350 MHz	0.5V rms	Electronic, wide-sweep, stable narrow sweeps.
900—1300 MHz	P-122	200 KHz—400 MHz	0.5V rms	Electronic, wide-sweep, stable narrow sweeps.
1.3—1.7 GHz	P-124A	500 KHz—400 MHz	0.5V rms	Electronic, solid-state, wide sweep.
.75—4 GHz	Microwave Plug-in Models P120 thru P128 see table above			

154C - 159C: These up-to-the-minute versions of Kay's 154 and 159 are completely solid-state, electronically swept, wide-sweep and marker generators which cover their ranges in a single wide sweep. The additional features of continuously variable sweep width and multiturn digital frequency dial provide exceptional fine touch settings over the video, IF and VHF range. The use of a broad output amplifier in these beat frequency units permits light coupling of the mixed oscillators, thus providing high RF levels with superior waveshape; distortion and spurious are minimal.

Performance characteristics include line lock, CW, manual, wide variable sweep rates, and external modulation input. Frequency range may be swept from HI to LO or from LO to HI as required. Automatic leveling may be controlled either externally or internally.

PCM7650B and PCM7660B marker plug-ins offer up to eight, optional, pulse or birdie markers at customer specified frequencies. New model PM7670 provides variable birdie marker plus harmonics of 1 and 5 MHz — plus counter output for critical measurements. Provision for a variable birdie marker derived from an external oscillator is included on these instruments. A built-in detector and precision step attenuator are standard features.

159C
1-300 MHz

Freq. Range	Model No.	Sweep Width	RF Output	Flatness	Markers	Features
50 KHz-110 MHz	154C	5 KHz-100 MHz	1.0 V., 50Ω metered	±0.25 db	PM7660 up to 8 single markers to order. PM7650 up to 8 pulse birdie or 7 harmonic birdie markers to order. PM7670 variable birdie plus 1 and 5MHz harmonic birdie markers.	Solid-state, wide sweep: plug-in marker system. Sweeps full 110 MHz to low end 50 KHz. Pulse and harmonic markers. Sweep rates .01-1000 Hz.
1MHz-300 MHz	159C	20 KHz-300 MHz	0.5 V., 50Ω metered			Similar to 154C solid-state sweep and marker system. Very flat, very low harmonics and spurious.

KAY Sweep Synthesizers

101A: The model 101A is a sweep synthesizer which provides not only the solid-state 100 MHz wide sweep capability of Kay's proven 154C (see above) but also superb, low residual, narrow sweep features essential for steep-skirted, narrow band filter applications and for the design and production of pin-point frequency discriminating circuits. In addition it provides a new order of swept and cw stability, of narrow-band frequency marking, of calibrated (0.01%) cw output frequencies, and of digital/analog programmability through the use of newly developed IC synthesizer circuitry. The price at around $3000 for a unit that includes a "locked" range of 100 KHz to 100 MHz is a fraction of the cost of the usual synthesizers.

Front panel controls select stabilized (±5ppm/min; 20ppm/hr) cw operation, stabilized narrow-sweep operation variable up to 4% of center frequency, or free-running wide sweep operation variable up to 100 MHz of sweep between the limits of 50 KHz and 110 MHz. The stabilized frequency output is controlled by a direct-reading 3 place digital switch arrangement (calibrated to ±0.002%) and a digital-reading, vernier dial calibrated for overall accuracy of ±0.01%. Center frequency and sweep width are remotely programmable.

The standard 101A includes a wide range of variable sweep rates, manual sweep, external and cw modes of operation, front panel zero adjust, built-in attenuators, and detectors; plus a pin-point digital-frequency readout. It also includes provision for switched pulse and birdie markers using the models PM7650 and PM7660 as above. IC circuits are used in the new variable plug-in module model PM-10. This complex system consists of: (1) A direct reading variable pulse marker — only cycles wide and accurate to ±.05%. (2) A slave pulse marker that can be accurately and simultaneously set only cycles away. (3) A mixer-amplifier providing all marker coupling and 30 db of pre-amplifier gain.

PLUG-IN RF MODULES		K10237			K10324	K10325-6	K10327-8
MODULE		FREE RUNNING	STABILIZED	STABILIZED	STABILIZED	STABILIZED	STABILIZED
FREQUENCY RANGES VARIABLE:		.05-110MHz	1-10MHz	10-100MHz	0.1-1.0MHz	1.0-5.0MHz 5.0-10.0MHz	10-30MHz 30-70MHz
RESIDUAL FM LINE RELATED: RANDOM:		500Hz pk 100Hz pk	200Hz pk 100Hz pk	300Hz pk 100Hz pk	5Hz pk 5Hz pk	5Hz pk 5Hz pk	20Hz pk 20Hz pk
SWEEP WIDTH RANGES VARIABLE:		0-100MHz	In 2 Ranges; —— 0 to 1% of Center Frequency 0 to 4% of Center Frequency				
AM SPURIOUS HARMONIC: NON-HARMONIC:		below —— 30 db below —— 30 db			below —— 40 db below —— 50 db		
SWEEP LINEARITY 100 MHz SWEEP: (WIDE) 0-4% SWEEP: (MEDIUM) 0-1% SWEEP (NARROW)		±5% (of sweep width)	±.5% (of sweep width) ±100Hz				
STABILIZED OUTPUT FREQUENCIES	FREQUENCY SETTABILITY FIXED STEPS: VERNIER:		10KHz 20Hz	100KHz 200Hz	1KHz 2Hz	10KHz 20Hz	100KHz 200Hz
	FREQUENCY CALIBRATION FIXED STEPS: FIXED plus vernier:		±.002% Accuracy (% of indicated frequency) ±.01% Accuracy (% of indicated frequency)				
	FREQUENCY DRIFT ONE MINUTE ONE HOUR 10 VOLT LINE VAR. PER °CENTIGRADE		± 5ppm on 0-1% Sweep Range; ±20ppm on 0-4%. ±20ppm on 0-1% Sweep Range; ±80ppm on 0-4%. ±10ppm on 0-1% Sweep Range; ±20ppm on 0-4%. ±30ppm on 0-1% Sweep Range; ±120ppm on 0-4%.		(AFTER 10 MINUTE WARMUP)		

RF Output:
1.0V RMS into 50 ohms, metered

Flatness:
±.25 db over full range

Attenuator:
Switched 30, 30, 20, 10, 6, 3, 2, 1, 0.5 db plus 3 db Var. No shift in center frequency.

RF-Blanking:
Off 80 db below 25 MHz: Off 80 db less 6 db per octave above 25 MHz.

ALC:
Internal ALC plus connection for external ALC DETECTOR.

RF Detector:
50KHz - 110MHz

Sweep Modes:
.01 to 100Hz in 4 ranges, plus line lock.
Manual Control
CW Operation
External Modulation

Horizontal Output:
8 Volts, p-p, Triangular waveshape with Trace/Retrace ratio selectable 1:1 or 9:1.

Sweep Direction:
Switched Hi-Lo, Lo-Hi.

Programming:
BCD inputs for each of 3 switched decades plus analog for vernier.

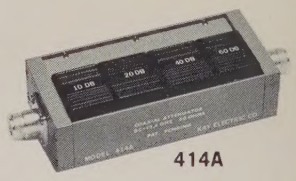
Switching Time:
26Ms above 1MHz
260Ms below 1MHz

KAY

PRECISION ATTENUATORS

435A

431C



414A

MODEL		431-C	432-D	1/432-D	439-A	460-A	437-A	1/439A	433-A	434-A
ATTENUATION RANGE		0-41 DB In 1 DB steps	0-101 DB In 1 DB steps	0-22.1 DB In 0.1 DB steps	0-101 DB In 1 DB steps	0-132 DB In 1 DB steps	0-102.5 DB In 0.5 DB steps	0-22.1 DB In 0.1 DB steps	0-119 DB in 1 DB steps	0-99 DB In 1 DB steps
FREQUENCY		DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-1 GHz	DC-500 MHz	DC-1 GHz
CONTROLS		In-line toggle switches	In-line toggle switches	In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Miniature In-line toggle switches	Rotary-Digital	Rotary-Digital
TYPICAL OVERALL ACCURACY (± DB) OR % OF INDICATED DB	DC-250 MHz	0.5	0.6	0-.5 DB steps: ±.05 DB/step 1-10 DB steps: ±.2 DB/step	.6	0.5	0.5	0-.5 DB steps: ±.05 DB/step 1-10 DB steps: ±.3 DB/step	0.6	0.6
	250-500 MHz	0.9	1.2		.6	1.0	1.0		1.2	0.6
	500-1000 MHz	1.2	2.0		1.5	1.5	1.5			1.5
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
MAXIMUM VSWR	DC-250 MHz	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
	250-500 MHz	1.4:1	1.4:1	1.5:1	1.3:1	1.2:1	1.2:1	1.2:1	1.4:1	1.2:1
	500-1000 MHz	1.4:1	1.4:1	1.5:1	1.4:1	1.4:1	1.4:1	1.4:1		1.4:1
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
INSERTION LOSS TYPICAL (db)	DC-250 MHz	.1	.1	.1	.1	.1	.25	.1	1	.1
	250-500 MHz	.2	.3	.3	.2	.2	.35	.2	2	.25
	500-1000 MHz	.5	.6	.6	.5	.5	.7	.5		.5
	1-2 GHz									
	2-4 GHz									
	4-6 GHz									
	6-12.4 GHz									
POWER (watts)		1	1	1	1	1	1	1	½	1
DIMENSIONS (inches)		2 x 7 x 2	2 x 9¾ x 2		1¼ x 6¼ x ⅞				5 x 2¼	2¼ x 2 x 5¾

Kay in-line and rotary attenuators are designed to provide a means of inserting an accurate and fixed amount of loss in circuits operating in the DC-12.4 GHz range. Attenuation is controlled by field-proven high-frequency toggle switches. Solid silver contacts set in Teflon for low loss and superior match are employed throughout. The precision resistors used are 1% tolerance, carbon film resistors. The maximum total error is very low and incidental insertion loss is negligible. These units have met rigid environmental tests and are traceable to N.B.S.

The individually-switched steps are isolated in broad-tuned, shielded compartments, providing high accuracy and a flat frequency response over the specified range. All models are symmetrical, (bi-directional), attenuators. Most models are available in either 50, 75, or 90 ohms.

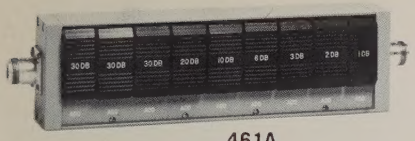
To afford maximum utility, Kay in-line attenuators are available for your special built-in applications. These attenuators are ideally suited for inclusion in a wide variety of equipment, such as test equipment, IF amplifiers, receivers, etc. In general, the electrical specifications are the same as for the in-line model. They differ, however, in mechanical configuration.

PROGRAMMABLE

A new series of programmable attenuators has been introduced to provide precise increments of fixed attenuation which may be switched from a remote position or be controlled by programmed opens and shorts on a 9 wire control system.

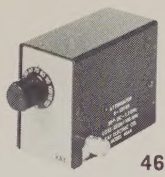
These models feature programmed values of attenuation in the DC-12.4 GHz region. Utilizing Kay's proven in-line models, these devices incorporate a new light-weight, low-cost control package that includes a low-level SCR network,

KAY



461A

460A



464A

464-A	467-A	435-A	436-A	1/435-A	400-A	461-A	424-A	414-A	495-A	411-A
0-120 DB In 10 DB steps	0-12 DB In 1 DB steps	0-10 DB In 1 DB steps	0-70 DB In 10 DB steps	0-1 DB In 0.1 DB steps	0-70 DB In 10 DB steps	0-132 DB In 1 DB steps	0-90 DB In 10 DB steps	0-130 DB In 10 DB steps	Single Step switched coax pads	Single Step switched coax pads
DC-1.3 GHz	DC-1.5 GHz	DC-2 GHz	DC-2 GHz	DC-1 GHz	DC-2 GHz	DC-4 GHz	DC-6 GHz	DC-12.4 GHz	DC-4 GHz	DC-12.4 GHz
Rotary-Step	Rotary-Step	Rotary-Step	Rotary-Step	Rotary-Step	Miniature Rotary-Step	Slide Switches	Slide Switches	Slide Switches	Slide Switches	Slide switches
1% ± .1	.2	0.1	1% ± .1	.025	± 1%	1% ± .1	1% ± .2	1 DB or 5% whichever is greater	1% ± .1	1 DB or 5% whichever is greater
1% ± .2	.2	0.1	1% ± .1	.025	± 1%	1% ± .1	1% ± .2		1% ± .1	
2% ± .2	0.3	0.3	1% ± 0.2	.025	± 2%	1% ± 0.3	1% ± .2		1% ± .2	
	0.5 to 1.5 GHz	±.5	±5%		± 4%	2% ± .3	1.5% ± .2		2% ± .2	
						2% ± .3	2% ± .2			
							2% ± .5			
1.2:1	1.2:1	1.1:1	1.1:1	1.1:1	1.1:1	1.05:1	1.05:1	1.1:1	1.05:1	1.1:1
1.2:1	1.2:1	1.2:1	1.2:1	1.2:1	1.1:1	1.05:1	1.05:1	1.1:1	1.05:1	1.1:1
1.4:1	1.25:1	1.3:1	1.3:1	1.4:1	1.15:1	1.1:1	1.1:1	1.1:1	1.1:1	1.1:1
		1.5:1	1.5:1		1.25.1	1.25:1	1.2:1	1.2:1	1.2:1	1.2:1
						1.5:1	1.3:1	1.3:1	1.5:1	1.3:1
							1.5:1	1.5:1		1.5:1
								1.5:1		1.5:1
.1	.15	.1	.1	.1	.1	.1	.1	.1	.1	.1
.15	.25	.1	.1	.1	.1	.1	.1	.1	.1	.1
.3	.5	.2	.2	,2	.2	.2	.2	.2	.1	.1
		.5	.5		.5	.3	.2	.3	.1	.1
						.5	.3	.5	.2	.2
							.5	.6	.3	.3
								1.0		.5
1	1	1	½	½	¼	1	1	2	1	2
1¾ x 3 7/16 x 2 11/16		2 dia. x 2⅛	2 dia. x 2⅞	2 dia. x 2⅛	1¼ dia.x2 3/16	8⅜x2⅜x1⅝	2⅜x4¼x1⅝	2⅜x5⅛x1⅝	2⅜ x 1½ x 1⅝	

ATTENUATORS

facilitating use in large test systems where a low current drain is essential.

A rotary control arrangement is available for remote sequential control of attenuator levels.

4430B — DC - 1300 MHz
0-135 db in 1 db steps

4461A — DC - 4 GHz
0-132 db in 1 db steps

4424A — DC - 6 GHz
0-90 db in 10 db steps

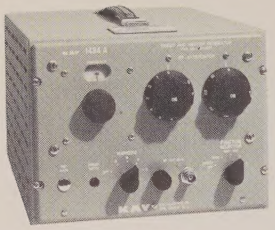
COAXIAL ATTENUATORS

A new group of switched, coaxial attenuators is now available to span the DC - 12.4 GHz range. Developed from Kay's precision VHF - UHF attenuators, these devices eliminate the cumbersome technique of inserting and reinserting individual pads or the need to go thru a time-consuming rotary step-cycle.

Individual attenuation steps are controlled by finger operated, spring-loaded slide switches. These models consist of a complete coaxial system. Each segment is constructed with air dielectrics, and fine silver contacts insuring precision surfaces. Individual steps are isolated in broad-tuned, shielded compartments.

A variety of models is available to provide customer specified attenuation and frequency ranges covering the 0 - 132 db — DC-12.4 GHz range. Standard models are listed on the attenuator chart; many attenuators in this series are available in single coaxial pads, two or three step versions or special versions to suit customer specifications.

KAY RADIO AND TV GENERATORS



1484A

- **One Band, Application Oriented, Sweep and Marker Units.**
- **Easy to Use, Lower Cost Excellent for Production.**

1483B: The new 1483B is a solid-state sweep and marker generator used to design, test, and align UHF-TV receivers, it develops a full 0.5 volt rms output into load over the entire channel 14 to 83 frequency range. A front panel control permits switching of the sweep width from a wide 520 MHz (entire UHF-TV band) to continuously variable widths from 60 down to 5 MHz.

Channels 14 and 83 are provided at two separate switch positions, allowing easy selection of the extreme ends of the UHF band. Single or harmonic frequency birdie marker modules are available at customer specified frequencies. A variable marker input is provided. Provisions have been made for the use of two, optional, precise rotary attenuators. The attenuation ranges available include 0-10 DB in one DB steps, 0-33 DB in 3 DB steps, and 0-60 DB in 10 DB steps.

1484-A: A new VHF fundamental frequency, wide sweep generator is now available as a plug-in module for use in the 1484. The module provides a swept output in a single sweep with no spurious and no beats generated. Harmonic distortion is more than 30 db down and the 1.0 V rms output is flatter than ±.25 db overall. Sweep width is continuously variable from 0 to the 190 MHz range of the module.

The standard 1484 offers sweep and marker capabilities in a limited (e.g., 10.7 MHz, 88-108 MHz) range production type unit. Frequencies may be selected up to 1 GHz.

The 1484 may be specified with pulse, CW and harmonic birdie markers, RF turn-off or post injection markers. RF output is controlled by two optional attenuators and a 5 db variable RF level control.

The 1484 as well as the 1483 is half rack size and may be combined for production applications utilizing dual outputs.

Model No.	Frequency Range	Features
1483	UHF Channels	Compact, Low Cost
1484	Selectable to 1 GHz	Production Radio and TV Sweeps

1024A

- **High Output Video Amplifier**
- **300MHz Wide Flat Amplifier**

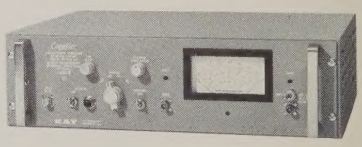
AMPLIFIERS

1022A, 1023A, 1024A: These solid-state video amplifiers include two wide-band models with excellent gain-bandwidth characteristics, (40 db - 150 MHz, 30 db - 300 MHz), and a high output 8 MHz unit delivering 15 volts rms into 50 ohms. Each of these amplifiers has unusually flat response over its full frequency range. Each is designed for accurate input and output impedances of 50 ohms, but can operate an accessory probe to provide amplification from high-impedance outputs without loading down the test signals.

For high impedance applications, the 965A broad-band probe is designed for operation with these 50 ohm input amplifiers.

LOG AMPLIFIERS

1025B: The 1025B gives overall response, and at the same time gives detailed, easily seen measurements of points on the curves as far down as 80 db. The unit permits highly accurate viewing of the skirts and sharp slopes of bandpass filters, single side-band filters, traps, etc. A control gives expansion of the top critical points simultaneously with the log display. 80 db log range, also available as undetected RF signal.



1025B

- **Log Amplifier for Swept Filter Applications.**

Model	Frequency	Features
1022	50KHz-8MHz	High 15V RMS Output Flat to Within .25DB
1023	1KHz-150MHz	40DB Gain; Compact Built-in Attenuator
1024	200Hz-300MHz	Wide Band Unit with 30DB Gain; Low Noise
1025	20KHz-220MHz	Log Amp with Dynamic Range of 80DB; Lin. Range

255B

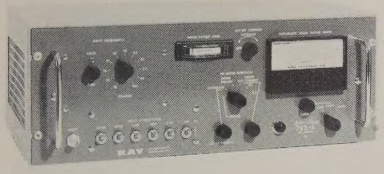
COAXIAL SWITCH

Essentially, the 255B provides a high frequency DPDT coaxial switch whose rate of switching can be set by an internal generator or can be locked to an external sync signal. A phase shift control is included so that the starting point of the switching action can be varied.

In general, any application which can benefit by a "simultaneous" display, by the continual referencing of one significant characteristic vs. another; by the action, that is, of an automatic switch with superior switching, range, and control can profitably employ the 255B.

- FREQUENCY RANGE: DC to 1000 MHz
- VSWR: DC to 500 MHz — less than 1.15:1
  500 to 1000 MHz — less than 1.4:1
- CROSSTALK: Down more than 70 DB, (measured at 200 MHz)
- SWITCHING RATE: With external sync, 0.2 - 100 Hz;
  With internal sync, 5 - 100Hz

KAY SOLID-STATE NOISE FIGURE METERS



792A

- TUNED IF INPUT AMPLIFIER (NO SPURIOUS READINGS
- BROAD 10-1000 MHz SOURCE (NO CHANGING SOURCE IN MID-BAND)
- OPTIMIZED IN PRICE AND PERFORMANCE FOR 10-1000 MHz RANGE
- NOISE MEASUREMENTS TO 26.5 GHz
- 75Ω MEASUREMENTS FOR CATV COVERAGE

The 792A is a sensitive, solid-state, noise figure meter. Primarily focused on the frequency range below 1000 MHz, this instrument provides better accuracy and greater flexibility at considerably less cost than conventional noise generators. The 7921A hot wire noise source is a unique broad band generator and operates over the full 10-1000 MHz range.

Provision is made for later addition of noise sources covering the range to 26.5 GHz. In this way, an expanded applications requirement can be met without the full expense or added space demands of an additional unit.

Additional noise sources provide variable impedance and balanced VHF outputs from temperature-limited diodes, waveguide output from argon gas tubes. Either 6 db or 15.2 db excess noise outputs can be selected for increased accuracy at low or high noise figures, respectively.

This wide coverage eliminates the inconvenience (and the inaccuracies) of changing noise generator source in mid-band, as is usually required.

INPUT FREQUENCY: 10-120 MHz Continuous Coverage

BANDWIDTH: Approx. 4% of Center Frequency

INPUT SENSITIVITY: 0 to 75 dbm (noise source on). Approx. 35 db gain required between lowest noise source & input.

INPUT IMPEDANCE: 50 ohms nominal

INPUT ATTENUATOR: Steps of 20, 10, 5, 3, 2, and 1 db.

Model No.	Frequency Range	Type	NF Range	VSWR	Excess Noise Output	Accuracy
7921A	10-1000 MHz	Hot Wire	0-20 db	1.2:1 to 900 MHz 1.35:1 to 1 GHz	6 db	±0.1 db 10-200 MHz ±0.2 db 200-400 MHz ±0.3 db 400-1000 MHz
NM-781	.4-4 GHz	Argon Waveguide	3-30 db	1.3:1	15.2 db	±0.5 db
RG-48/U RG-53/U	2.6-26.5 GHz	Argon Waveguide	3-30 db	1.1:1	15.45 db	±0.5 db

NOISE GENERATORS

780A

240, 403, 780: These models are calibrated random noise sources providing output over a wide frequency and power range. They employ noise diodes with tungsten filaments as temperature-limited noise generators. The plate voltage of the noise diode is regulated and the diode plate current, (proportional to noise power output), is variable by a front panel control. A calibrated meter provides direct reading in noise figure. The ability to vary the noise output in an accurately known way, greatly simplifies the measurement process since it permits precise matching of circuit noise rather than a more complicated referencing back to some fixed output.

Model	Frequency	Features
240	5-220MHz	0-23.8DB Noise Figure
403	3-500MHz	0-19DB Noise Figure
780	1-3GHz	0-20DB Noise Figure

PULSED RF SIGNAL GENERATOR

The 5070-B is a solid-state instrument whose pulsed output features sharp rise and decay and flat tops. The unit will serve as a CW generator, as well as a video pulse generator. It provides a stable CW signal from 10 MHz to 120 MHz, continuously variable, in five overlapping bands.

The features of flat, pulsed RF, continuously variable frequency, sharp 10 ns rise and decay time, and low leakage provide for reliable and accurate measurements. The RF output is held at the same peak levels during either CW or pulsed RF operation. The carrier pulses are flat (including overshoot) within ±5% and the off levels are more than 70 db (to 85 db) below the carrier level at all frequencies.

5070B

CARRIER-OFF LEVEL: 85 db to 30 MHz, 80 db to 70 MHz, 70 db to 120 MHz.

PULSED CARRIER RISE AND DECAY TIMES: Less than 10 ns.

VIDEO PULSE RISE AND DECAY TIMES: Less than 20 ns.

PULSE REPETITION RATE: 50 pps to 5000 pps.

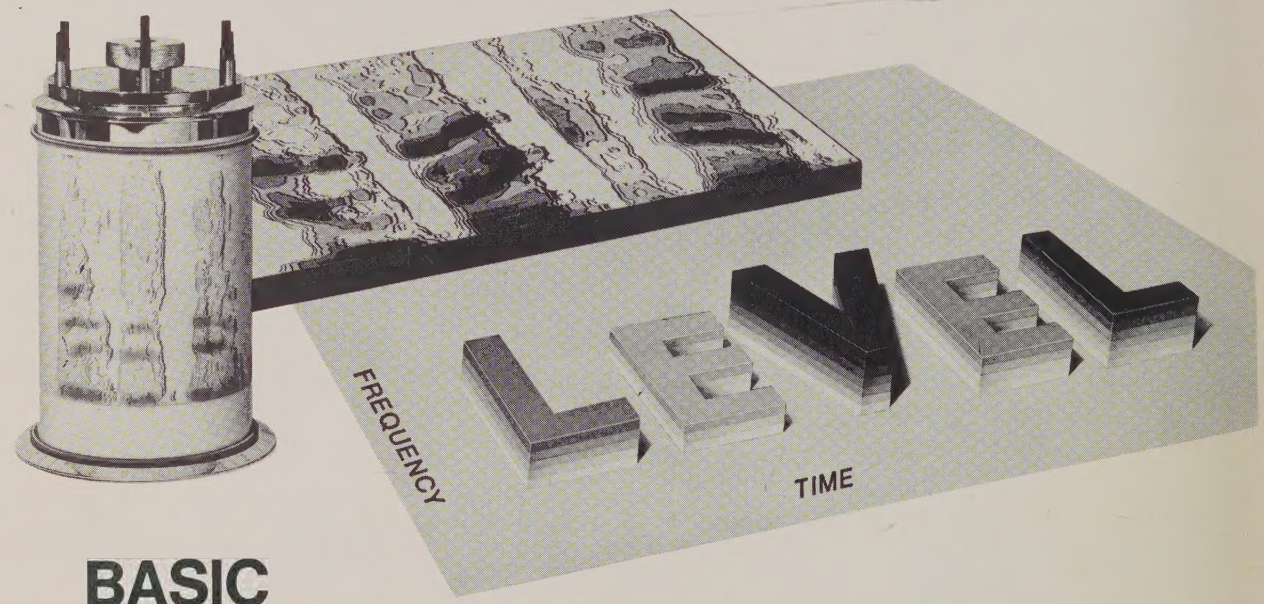
PULSE WIDTH: 100 ns to 100 μs.

ATTENUATOR: 101 db in 1 db steps plus approximately a 6 db continuous variation.

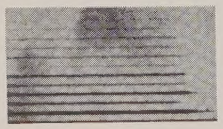
OTHER MODELS AVAILABLE

The Model 5071-A offers a wider frequency range of 10-250 MHz. The new model 5070B-1, a self-gating system which permits the observation and measurement of changes in RF signal under pulsed RF conditions.

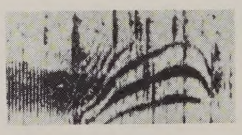
KAY Sound Spectrographs do for sound or electrical signals what a spectroscope can do for complex light. They can sample a signal and print out a graph showing all component frequencies, their relative levels and their duration.



BASIC SPECTROGRAPH 1HZ-107KHz


MUSICAL

MEDICAL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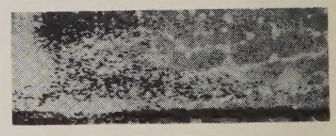
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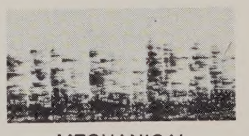
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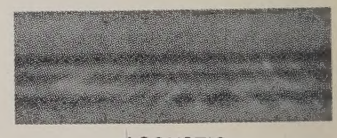
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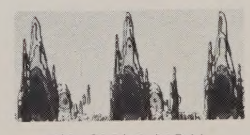
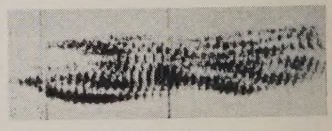

PHYSIOLOGICAL


GEOMAGNETIC

For catalogs and information or to discuss new applications, please contact: Irving Silberg at

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RF TEST INSTRUMENTS

NEW *Syntha-Sweep* 101A

Sweep synthesizer performance at far from "synthesizer" cost

Integrated circuits

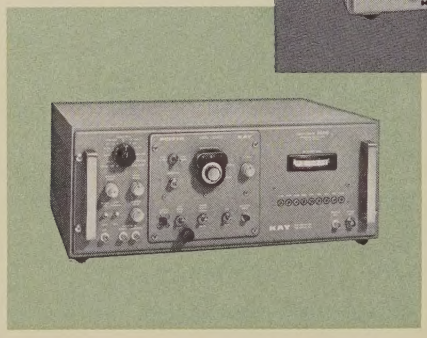
- 50 KHz to 110 MHz
- 100 KHz to 70 MHz Stabilized Narrow Sweep and CW
- Wide Sweep ■ Markers

ADDS A NEW DIMENSION- to KAY Pace Setter, RF Sweep Technology

- Solid-state, wide-sweeps now locked for *.01%-stable* narrow sweeps and CW
- Pulse type markers now spaced *cycles* apart
- Voltage-controlled sweeps now precision controlled for *computer control*
- Direct reading digital frequency dial now .05% accurate for CW and narrow sweeps

Audio Spectrum Analyzers ■ Sweep and Marker Generators ■ Noise Generators ■ Attenuators

NEW IN THIS ISSUE...



New **FM SWEEP and MARKER GENERATOR**

1485A—Solid-state 10.7 and 88-108 MHz in low-cost package.

New **WIDE SWEEP and MARKER GENERATORS**

154C—Better-than-ever version of our solid-state 154 featuring extended range to 110 MHz-modular construction.

159C—Up-to-the-minute version of solid-state **159** featuring external levelling, wide sweep rate ranges and modular construction.

New **SWEEP and MARKER GENERATOR**

1500C—A new, solid-state version of our versatile 1500 system, featuring new solid-state sweep and marker plug-ins.

New **SWEEP GENERATOR**

860H—New solid-state version of our plug-in 860 sweep system featuring new solid-state sweep plug-ins.

New **PRODUCTION-ORIENTED SWEEP and MARKER GENERATOR**

1484A—Sweep ranges to order from 2 MHz to 1 GHz.

New **UHF-TV SWEEPS**

1483B—Solid-state unit sweeps channels 14 thru 83 in 520 MHz wide sweep. Low cost; compact.

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IN OUR SPECTRUM ANALYZER CATALOG

New **HIGH-SPEED, WIDE RANGE UNIT**

7029—Solid-state 5-16000 Hz analyzer features selectable sampling times, 6070A, 6076C and special filter plug-ins; modular construction.

New **CONTOUR ANALYZER**

6051A—85-8000 Hz unit provides 3-D contour analysis. Low cost; solid state.

New **CONTOUR PLUG-IN**

6070—Fitted for both 6061A and 7029A analyzers, this model provides contour display for quantitative measurements on three dimensional plot.

IN OUR ATTENUATOR CATALOG

New **4 GHz COAXIAL ATTENUATOR**

SERIES 110—Provides 0-132 DB of precise attenuation in one DB steps over DC-4 GHz range.

New **MINIATURE ATTENUATORS**

SERIES 100—5" small unit gives 0-132 DB in 1 DB steps; features Kay's RF Mini-switches.

SERIES 120—0-102.5 DB in 0.5 DB steps. Same panel-mounting size of series 100.

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Sweep-Aids	28-29
Ordering Information	31

KAY
ELECTRIC COMPANY

1410

ULTRA-STABLE SWEEP AND MARKER GENERATOR

- FREQUENCY RANGE: **20 Hz to 200 KHz**
- RESIDUAL FM: **< 0.1 Hz**
- DRIFT: **< 2 Hz in one min.**
- OPERATING MODES:
  30 Hz Line Lock
  Three Lin or Log Ranges
  0.2 - 1 Hz; 1 - 5 Hz; 5 - 25 Hz
  Manual
  External
- SWEEP WIDTH: **Three Ranges**
  20 Hz to 2 KHz 0.2 to 20 KHz 0.2 to 200 KHz
- MARKERS: **optional. Nine crystal pulse-type markers, at customer specified frequencies; variable marker input provided.**
- OUTPUT LEVEL: **5V rms into 600 ohms**
- FLATNESS: **± 0.5 db over widest sweep**

Sweep Output: Approx. 7V. p-p
Calibrated CW Output: 20 Hz to 200 KHz
Built-in Attenuator: Switchable steps: 3, 6, 10, 20, db, plus 6 db variable
Power Supply: Input approx. 220 watts; 117V (± 10%), 50-60 Hz.
Dimensions: 19⅜" x 10⅞" x 16⅛".
Weight: 57 lbs.

The 141D is a 20 Hz to 200 KHz sweep and marker generator designed for stable operation as a narrow band unit capable of sweeping steep-skirted filters and, in another mode, as a 200 KHz wide audio frequency sweeping oscillator. The 141D provides a complete measurement system, including — logarithmic, linear, and manual sweeps or a calibrated c-w signal; sharp, "crystal", pulse-type frequency markers and precision step attenuator.

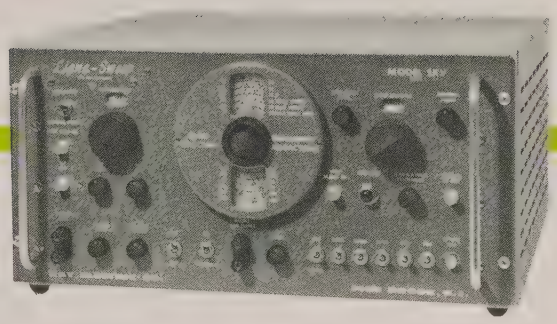
VARIABLE CENTER FREQUENCIES

The 141D is a double heterodyne sweep generator employing three crystal-controlled oscillators. Either linear or log sweeps are available with center frequencies continuously variable between 20 Hz and 200 KHz. The swept output is blanked during retrace time, providing a zero-voltage baseline. To eliminate phasing adjustments, a sawtooth voltage synchronized with the swept output, is available to drive the X-axis of the scope.

FREQUENCY MARKERS

Up to 9 optional crystal markers at frequencies from 400 Hz to 200 KHz, are individually controlled by front panel switches and appear as sharp pulses. To insure maximum marker stability, please indicate when ordering whether the markers are to be used on the 200 KHz or the 20 KHz sweep range. Markers specified for use on the 20 KHz range will not operate on 200 KHz range and vice versa. Minimum spacing for markers is 200 Hz. For many applications the use of the unit in the manual sweep mode will be an invaluable aid in determining frequency at critical points. In manual operation the sweep can be stopped at a particular point of interest and the precise frequency may be monitored by a frequency counter at the counter output on the 141D.

935C



AUDIO, VIDEO, VHF SWEEP AND MARKER GENERATOR

The 935C is a general purpose sweep and marker generator combining fundamental and beat frequency techniques in a single unit. The beat frequency system provides a video sweep from 10 MHz to 1 KHz in one display. Two additional video bands provide optimized narrow band stability. For high frequency work, 9 bands operating at fundamental frequencies, provide wide sweeps from 10 to 220 MHz. At the low end of the spectrum, an audio sweep oscillator from 50 to 20,000 Hz is available. Seven narrow, highly stable, fixed bands at customer specified frequencies are available for repetitive applications.

VARIABLE CENTER FREQUENCIES

Continuously variable outputs are covered in 12 overlapping bands from 10 KHz to 220 MHz with direct reading frequency calibration. The sweep width is continuously variable and swept output is blanked during retrace.

FREQUENCY MARKERS

As many as 7 accurate crystal pulse-type markers are available at customer specified frequencies between 50 KHz and 220 MHz. These are automatically switched in when the proper frequency is reached.

OUTPUT VOLTAGE

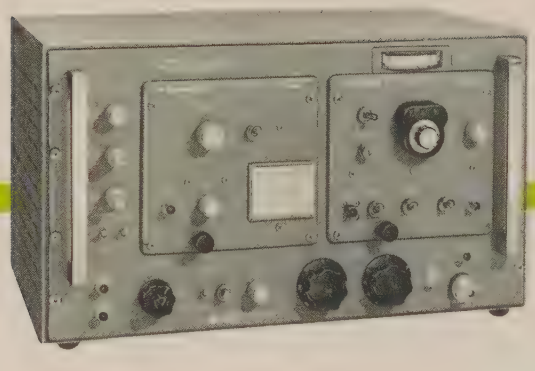
The 935C generates a high-level RF output of 1.0 V. rms into 70 ohms (50 ohms on request) over its entire frequency range, with a fast-acting AGC circuit holding the output, delivered through a built-in, flat and accurate RF attenuator, to ± 0.5 db over the widest sweep.

Lowest Frequency Video Band using 10 MHz Sweep
Width: 1 KHz at 30 Hz, lin; 200 Hz at 5 Hz log; 1 KHz at 1 Hz Lin.

FREQUENCY	SWEEP
■ AUDIO:	
50 Hz - 20 KHz	50 Hz to 20 KHz
■ VIDEO:	
0.01 - 2 MHz	50 Hz - 20 KHz
0.01 - 12 MHz	To 1 MHz
0.01 - 12 MHz	To 10 MHz
■ VHF:	
10 - 220 MHz	To 60% of center below 50 MHz; 30 MHz above
■ 7 FIXED:	
(optional) 20 KHz to 12 MHz	50 Hz to 20 KHz

- OPERATING MODES:
  60 Hz Line Lock
  Three Lin or Log ranges
  0.2 - 1 Hz; 1 - 5 Hz; 5 - 25 Hz
  Manual External
- RF OUTPUT: 1.0 V. rms into 70Ω
  Audio; 1.0 V. rms into 600Ω
- FLATNESS: ± 0.5 db over widest sweep

Attenuators: Switched 20, 20, 10, 6 and 3 db plus 3 db variable.
Sweep Output: Sawtooth 7 V. p-p approx.
Power Supply: 117 V. (± 10%), 50/60 Hz, 220W., regulated.
Dimensions: 9¾" x 19½" x 17¼".
Weight: 65 lbs.



1500C

SOLID-STATE SWEEP AND MARKER GENERATOR

1500C

- PLUG-INS: **20 Hz to 1 GHz Sweeps and Markers**
- SWEEP MODES: **.01 — 100 Hz, 30 Hz Line Lock, Manual, External, One-Shot Sweep**
- MARKERS: **Pulse-type or single or multiple birdie-pip type markers at customer specified frequencies. Marker amplitude continuously variable.**

Sweep Direction: Hi-Lo; Lo-Hi
Blanking: On-Off
Sweep Output: Sawtooth, amplitude 7 V. p-p, approx.
Attenuators: 0-60 db in 10 db steps
0-10 db in 1 db steps
6 db variable
Dimensions: 19½" x 11" x 16¼".
Weight: 52 lbs.

860H

- PLUG-INS: **20 Hz to 1 GHz sweeps**
- SWEEP MODES: **.01 — 100 Hz, 60 Hz Line Lock, Manual, External, One-Shot Sweep**

Attenuator: 0-102.5 db in 0.5 db steps
Sweep Output: Sawtooth, amplitude 7 V. p-p, approx.
Dimensions: 19½" x 9¼" x 13¼".
Weight: 23 lbs.

The 1500C sweep and marker generator features both sweep generator and marker generator plug-ins over the new extended frequency range of 20 Hz to 1 GHz. It offers varied combinations of general purpose and special applications sweep and marker units. The basic unit contains a variable, sawtooth sweep generator, a fast acting AGC, frequency-marker control and output circuits, RF output circuits with precision attenuators, a calibrated output meter, an accurate RF detector and carefully regulated power supplies. The 1500C functions as a voltage-tuned oscillator over its full range.

VARIED SWEEP MODES

A wide choice of sweep repetition rates are available permitting selection of an optimum rate for each application. The sweep may be varied continuously from 0.01 to 100 Hz; going slowly enough through the passband to permit sweep alignment of very high Q circuits; or can be locked to the line for general operation. Manual control of the RF frequency sweep and the synchronized deflection voltage sweep is provided to permit tracing of the frequency display with point-by-point control. In this way, the most demanding circuits can be checked or recorded. VTVM and frequency measuring equipment can be added to permit swept-frequency alignment AND the gathering of many-digit, numerical data from a single, easy-to-operate setup. The sawtooth signal, synchronized with the swept RF output, is available at separate output terminals to drive the X-axis of an oscilloscope or recorder. No phasing adjustments are necessary. A blanking circuit turns off the RF output during retrace to establish a zero reference line. Up to 70 db of attenuation is provided by precision rotary attenuators and an additional variable 6 db in an rf gain control give continuous attenuation.

PULSE MARKERS

The marker output circuits provide sharp, pulse-type frequency pips which are available at a separate output

- SOLID-STATE
- ONE-SHOT SWEEP
- WIDE SWEEP RATE RANGE .01 — 100 Hz

Model	Frequency	Page
	Typical Sweep Plug-ins	
PC-141B	20 Hz - 200 KHz	8
PC-142B	35 Hz - 600 KHz	8
PC-130F	100 Hz - 2 MHz	8
PC-152B	10 KHz - 20 MHz	9
PC-154A	50 KHz — 115 MHz	9
PC-855B	2 MHz - 32 MHz	10
PC-856B	10 MHz - 120 MHz	10
PC-860E	2 MHz - 220 MHz	11
PC-867B	220 MHz - 470 MHz	11
PC-123A	100 MHz - 1 GHz (ANY OCTAVE)	20
	Typical Marker Plug-ins (1500C only)	
PCM-7631A	10 KHz - 2 MHz, 6 Pulse + Ext.	12
PCM-7632A	1 KHz - 1 MHz, 6 Pulse + Ext.	12
PCM-932B	2 MHz - 240 MHz, 30 Pulse + Ext.	13
PCM-861A	200 KHz - 1 GHz, 6 CW or 5 MULTIPLE BIRDIE-PIP TYPE	13

- PLUG-IN DETECTOR
- PULSE AND BIRDIE MARKER SYSTEMS
- ROTARY ATTENUATORS

jack. These markers are variable in output from 0 to 10 volts peak and are fed independently to the vertical input of the oscilloscope. They are completely isolated from the circuit under test, cannot overload or affect the circuit in any way and are fully visible in traps and along the base line. These pulse markers are sharp and clean and their width is a controlled fractional percentage of total scope deflection. Neither marker width nor marker shape are affected by changes in frequency sweep. They provide the same, excellent sharp pulse indicators on a narrow sweep width of kiloherz, as on a wide sweep width of megaherz. Most sweep generator heads supplied with the 1500C provide for switching of the pulse markers to function as RF turn-off markers, appearing in the swept RF output of the sweep generator.

BIRDIE MARKERS

Both CW and Harmonic crystal oscillator birdie markers operate over the full frequency range.

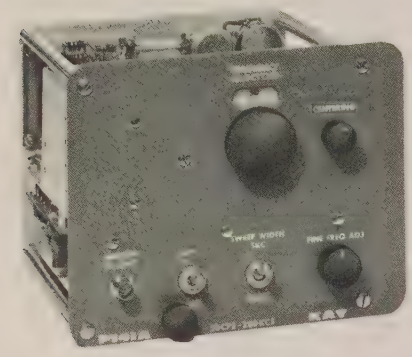
860H

SOLID-STATE
WIDE RANGE SWEEP GENERATOR

The 860H sweep generator provides sweep generator plugins over the new extended frequency range of 20 Hz to 1 GHz. Although it is lower in cost and smaller than the 1500C sweep and marker generator, the 860H includes all of the characteristics and features of the 1500C, less the marking system. It is intended for use where: a. Frequency marking is obtained from a central system.* b. Frequency marking is obtained from a frequency counter used in conjunction with the 860H operated in MANUAL mode. In this application, response characteristic is usually examined under swept-mode conditions; additional frequency data is obtained from a counter in conjunction with a voltmeter or log amp meter reading. c. Frequency marking is derived from external oscillators coupled into the system at points down the line from the sweep generator.

*Model PCM-861 may be ordered self-contained with built-in power supply to supplement the 860H as a Marking System.

PC-141B



20 Hz - 200 KHz

- FREQUENCY RANGE: 20 Hz - 200 KHz
- SWEEP WIDTH:* 0 - 5 KHz, 0 - 20 KHz
- *RESIDUAL FM: <0.2 Hz
- DRIFT: <3 Hz in 1 min., <15 Hz in 15 min.

Output: 1.0 volts rms in 50Ω, metered
Flatness: ±0.5 db over the widest sweep
Weight: 6 lbs.

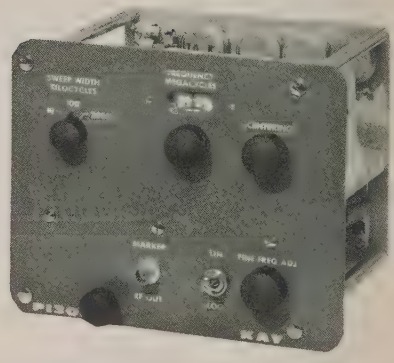
PC-142B

35 Hz - 600 KHz

- FREQUENCY RANGE: 35 Hz - 600 KHz
- SWEEP WIDTH:* Wide: 40 KHz @ 20 KHz, 10 KHz @ 600 KHz; Narrow: 10 KHz @ 10 KHz, 2.5 KHz @ 600 KHz
- *RESIDUAL FM: <0.3 Hz
- DRIFT: <10 Hz in 1 min., <50 Hz in 15 min.

Output: 1.0 volts rms in 50Ω, metered
Flatness: ±0.5 db over the widest sweep
Weight: 6 lbs.

PC-130F



100 Hz - 2 MHz

- FREQUENCY RANGE: 100 Hz - 2 MHz
- SWEEP WIDTH:* 0 - 10 KHz, 0 - 100 KHz, 0 - 2 MHz
- *RESIDUAL FM: <1.0 Hz
- DRIFT: <30 Hz in 1 min., <120 Hz in 15 min.

Output: 1.0 volts rms in 50Ω, metered
Flatness: ±0.5 db over the widest sweep
Weight: 6½ lbs.

ULTRA-STABLE NARROW BAND SWEEP PLUG-INS

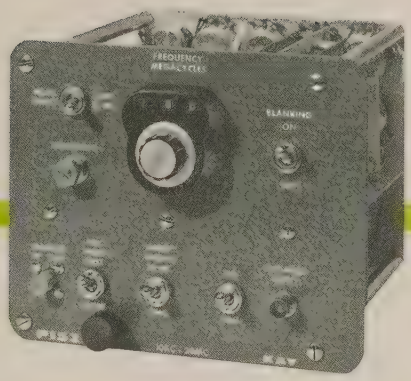
The PC-130F, PC-141B and PC-142B are solid-state sweep plug-ins designed for stable operation as narrow band units capable of sweeping steep-skirted filters and, in another mode, as wide-sweeping oscillators.

The excellent stability of these plug-ins permits manual control when used in either the 1500C or 860H basic rack units. In both generators, manual control of the RF frequency sweep and the synchronized deflection voltage sweep is provided to permit tracing of the frequency display with point by point control. In this manner, the most demanding circuits can be checked or recorded. VTVM and frequency measuring equipment can be added to permit swept frequency alignment and the gathering of many-digit numerical data from a single, easy-to-operate set-up. With a choice of log or lin frequency sweep, amplifier responses can be displayed with meaningful low end expansion.

These plug-in units are beat frequency oscillators equipped with an output amplifier to provide 1.0 V. rms into load. The use of an output amplifier permits light coupling of the mixed oscillators; this, with careful shielding and a balanced modulator, provides excellent waveshapes.

Provisions for blanking of the swept RF at precise frequencies are included adding to the versatility of these plug-ins. Internal marker frequencies are determined by the frequencies specified for the marker plug-in unit. Internal markers are not available when these plug-ins are used with the 860H basic rack unit.

PC-152B PC-154A



WIDE SWEEP PLUG-IN

PC-152B

- FREQUENCY RANGE: **10 KHz to 20 MHz**
- SWEEP WIDTH: **Two Bands:**
  10 KHz - 20 MHz
  10 KHz - 2.0 MHz
- HARMONIC & SPURIOUS:
  Approx. 30 db down
- OUTPUT: **1.0 V. rms into 50Ω, metered.**
- FLATNESS: **± .5 db overall, agc'd.**

Weight: 6½ lbs.

PC-154A

- FREQUENCY RANGE: **50 KHz to 115 MHz**
- SWEEP WIDTH: **Two Bands**
  NARROW: **200 Hz to 5 MHz**
  WIDE: **1000 Hz to 100 MHz**
- SWEEP DISPLAY: **Logarithmic or linear**
- HARMONICS & SPURIOUS:
  More than 30 db down
- OUTPUT: **1.0V rms into 50 ohms**
- FLATNESS: **± .25 db overall agc'd.**

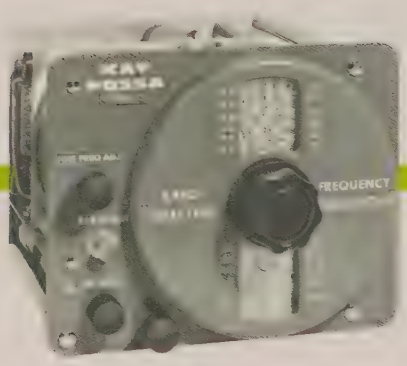
Weight: 6 lbs.

The PC-152B plug-in is a 20 MHz wide video sweep generator which reaches down to give 20 MHz to less than 10 KHz in a single linear or logarithmic sweep. Additional features of continuously variable sweep widths and continuously variable center frequency provide excellent operation as a stable, narrow band sweep generator covering AM, IF and VIDEO frequencies in two switched bands. A multi-turn center frequency control provides exceptional fine touch setting of narrow sweeps and a direct reading, digital, frequency dial. Provisions for internal blanking markers are included when this plug-in is used with the Marka-Sweep 1500C.

The PC-152B is a solid-state, electronic beat frequency oscillator equipped with an output amplifier to provide a full 1.0 volt rms into load. The use of this additional broad band amplifier permits light coupling of the mixed oscillators, gives high output with superior wave shape and very low spurious. A two-speed AGC circuit provides flat output overall. Careful shaping of the electronic modulating circuits provide for controlled, meaningful frequency linearity.

When used with the Model 860H or Model 1500C sweep generator racks, performance characteristics include either linear or logarithmic sweeps and switchable sweep widths continuously variable to either 2 or 20 MHz. Any portion of the range can be swept in a centered sweep.

The new PC154A sweep plug-in is a wide-sweep generator covering from the low video frequencies to beyond the FM tuner frequencies in a single sweep, or in any portion down to a remarkable 100 Hz of residual. This solid-state unit is a beat oscillator with broad-band output amplifier and a voltage-controlled electronic sweep modulator. Provisions for developing RF turn-off frequency markers are included.



PC-855B PC-856B

ULTRA-STABLE, NARROW SWEEP PLUG-INS

- FREQUENCY RANGE: **2 to 32 MHz**
- SWEEP WIDTH:* **0 to 2% (table)**
- *RESIDUAL FM:
  Narrow — 5 Hz @ 5 MHz
  10 Hz @ 32 MHz
  Wide — 2-3 times greater
- DRIFT: **As given below**

RF Output: 1.0 V. rms into 50 ohms, agc'd.
Blanking: 80 db off.

The PC-856B includes all of the characteristics and features of the PC-855 with a frequency range of 10 - 120 MHz.

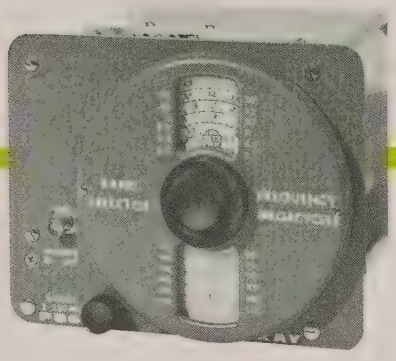
The PC-855B is a new, 2 to 32 MHz sweep and cw generator plug-in head designed to meet the rigorous requirements of narrow band, steep-skirt filter applications. It is a versatile and flexible swept-frequency unit (sweep controlled electronically) that operates to the highest "signal generator" standards of long and short term frequency stability. It is a fundamental frequency, low distortion, single frequency oscillator (sweep controlled manually) that holds firm on the sharpest slope, is easy to set and easy to count.

The PC-855B covers its frequency range in 12 overlapping, direct reading frequency bands. Two sweep width ranges are switched internally — a "wide" sweep (max. 1 to 2% of center frequency) or a "narrow" sweep (max. 1/20 of wide). Both ranges are continuously variable from these maximums down to residual (nominal zero).

Band	Freq. Range (MHz)[1]	Wide Sweep (KHz) Low[2]	Wide Sweep (KHz) High[2]	Narrow Sweep (KHz) Low[2]	Narrow Sweep (KHz) High[2]	1 Min. Typical Drift (Hz)[1]	Typical Freq. Shift with 5 V. Line Change (KHz) Wide	Typical Freq. Shift with 5 V. Line Change (KHz) Narrow
1	2.0 - 2.5	20	45	1.0	1.8	±25	.15	.085
2	2.5 - 3.0	25	45	1.1	1.9	±20		
3	3.0 - 3.6	30	50	1.3	2.3	±20		
4	3.6 - 4.5	45	85	1.6	3.1	±25		
5	4.5 - 5.7	55	100	2.0	4.0	±30	.15	.063
6	5.7 - 7.2	70	130	5.5	5.0	±35		
7	7.2 - 9.0	85	165	3.2	6.0	±20		
8	9.0 - 11.5	100	200	3.8	7.7	±25	.18	.08
9	11.5 - 14.8	110	235	4.7	10.5	±35		
10	14.8 - 19.2	130	300	6.0	13.0	±25		
11	19.2 - 25.0	150	350	8.0	17.0	±60		
12	25.0 - 32.0	210	440	10.0	21.0	±70	.737	.55

[1]With rear mounted fan and constant line voltage. [2]Typical maximum widths at ends of frequency bands.

PC-860E PC-867B



FUNDAMENTAL FREQUENCY SWEEP PLUG-INS

PC-860E

The PC-860E is a general purpose sweeping oscillator providing high-level fundamental frequency output continuously from 2 to 220 MHz. Compatible with either the Kay Model 1500C or Model 860H, it provides frequency sweeps which are flat and linear and generates enough output voltage to permit testing of lossy networks. The RF output over the range is held constant by a fast acting AGC response circuit and is fundamental frequency, assuring excellent waveshape and the complete absence of spurious products.

TWELVE FUNDAMENTAL BANDS

The PC-860E covers the spectrum from 2 to 220 MHz in twelve switched overlapping bands with a direct reading frequency calibrated dial. The restricted range of each individual band makes for a superior, fine-touch tuning of center frequency, unusual in a unit of such wide overall capabilities. Over its entire range, the PC-860E generates an RF output of 1.0 volt rms into load and AGC holds overall amplitude variation to a maximum of ± 0.5 db. For frequencies below 50 MHz, sweep width is continuously variable to 60% of center frequency; above 50 MHz, the maximum width is approx. 30 MHz.

MODULE OSCILLATOR TURRET

The oscillator turret assembly is a high quality unit using individual molded teflon sections and solid silver contacts. The tuning element for each band is contained in a separate plug-in module, which may be removed for inspection, or may be replaced. For particularly narrow sweep or other special applications, additional special modules at a desired frequency may be obtained at nominal cost.

A separate output jack makes a tapped-down, swept-RF voltage available for combining with external frequency marker units.

- FREQUENCY RANGE: **2 to 220 MHz**
- SWEEP WIDTH: **Continuously variable to 60% of center frequency below 50 MHz to approx. 30 MHz above 50 MHz.**

RF Output: Continuously variable to maximum of 1.0 V. rms (metered) into 50 ohms.
Flatness: ± 0.5 db over widest sweep.
Weight: 7 lbs.

PC-867B

The PC-867B is a solid-state, fundamental frequency, electronic sweep generator plug-in. It covers center frequencies from 220 to 470 MHz in one band and provides a calibrated frequency dial. Actual center frequency variation is achieved by a 3 turn, inductive tuning element, geared through a favorable turns ratio to the one-band dial. In this way, fine vernier control of frequency is obtained. The solid state frequency modulating circuits are dc coupled, permitting manual control of frequency deviation and the use of the PC-867B as a voltage controlled oscillator driven by externally generated signals. A dual sweep width circuit optimizes the modulating circuits for narrow band stability.

- FREQUENCY RANGE: **220 to 470 MHz**
- SWEEP WIDTH: **20 KHz to 30 MHz, 70 MHz at 470 MHz**

RF Output: 0.5 V. rms into 50Ω
Flatness: ± 0.5 db over widest sweep, agc'd.
Weight: 5½ lbs.

PCM-7631A
PCM-7632A

PULSE-TYPE MARKER PLUG-IN

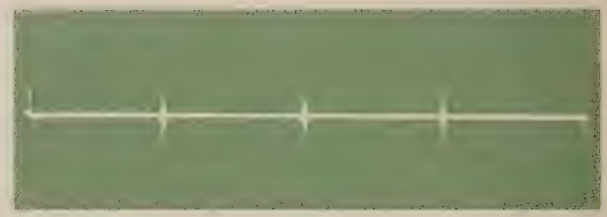
The PCM-7631A and PCM-7632A are precision, multi-frequency, pip generators providing the forming and control circuits for six sharp pulse-type markers. Each marker is individually controlled. They can all be used one at a time, all at one time, or in any combination best suited to mark all the selected alignment frequencies. Each individual marker circuit generates only one mark for the alignment display. It appears at the exact frequency selected, requires no counting, interpolation, estimating or "selective vision".

FIXED AND VARIABLE MARKERS

Six fixed, crystal positioned markers are available and provision is made for development of a variable-frequency pulse-type marker by an external CW oscillator. The frequencies of the markers can be specified as required and can be individually changed at a later date by replacing plug-in crystals. The low cost of these plug-ins makes it possible to keep supplemental frequency marking units for important applications. Both accuracy and ease of alignment are made possible by having a complete display of fixed markers at all relevant points and the added versatility of a calibrated, moving pulse.

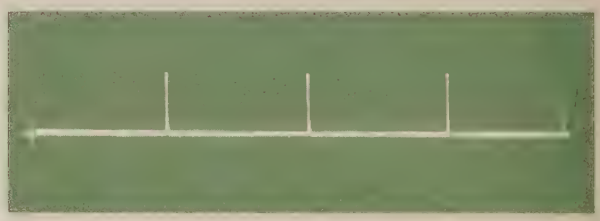
- FREQUENCY RANGES:
  PCM-7631A — 10 KHz to 2.0 MHz
  PCM-7632A — 1 KHz to 1.0 MHz
- FIXED MARKERS: **Six crystal, pulse-type markers, individually switched.**
- MARKER FREQUENCIES: **To order.**
- VARIABLE MARKER: **Provision for variable pulse marker from external oscillator.**

Marker Spacing:
PCM-7631A — approx. 5 KHz minimum
PCM-7632A — approx. 1 KHz minimum
Marker Amplitude: Positive pulse, variable 0 to 10 volts peak approx.
Weight: 4 lbs.



SINGLE FREQUENCY BIRDIE MARKERS

HARMONIC BIRDIE MARKERS



PULSE MARKERS

BLANKING MARKERS

PCM-861

CW AND HARMONIC MARKERS

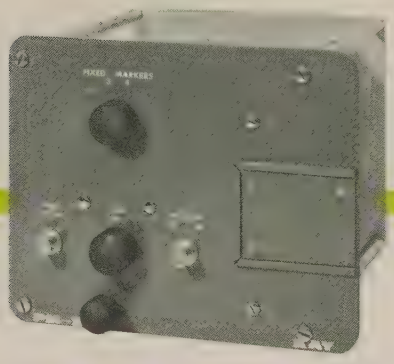
The PCM-861 offers individually switched, single frequency and/or harmonic birdie-pip markers between 200 KHz and 1 GHz. Up to six individual crystal oscillator markers can be ordered at customer specified frequencies. Up to five harmonic markers can be ordered at a specified frequency and its harmonics. Single frequency and harmonic frequency markers can be combined in the same plug-in; the maximum number for the combination is five. The individual marker oscillators are plug-in modules and can be replaced or added to as required.

The birdie-pip markers are shaped, beat-note markers available at a separate output jack. They connect independently to the oscilloscope or recorder and bypass the circuit under test. As with the pulse markers, they will appear in traps and along the baseline and cannot overload the circuits under test. Variable birdie, single or harmonic frequency markers may be produced by introducing an external CW signal(s) at the desired frequency to the variable marker input terminals.

- FREQUENCY RANGE: **200 KHz to 1 GHz**
- FREQUENCY MARKERS: **Six, .005% xtal osc single birdie-pip markers; five harmonic (and/or single) markers.**

Marker Frequencies: Customer specified.
Marker Spacing: 75 KHz
Marker Amplitude: Fundamental - 10 V. p/p
Harmonic - 2 V. p/p
Variable Marker: Provisions for variable single or harmonic birdie-pip using external CW oscillator.
Weight: 6 lbs.

PCM-932



PULSE MARKERS

The PCM-932 is a 31 marker, 2 to 220 MHz frequency pip generator providing the forming and control circuits for up to 30 sharp pulse-type marks and a variable pip mark. The markers are available in six groups of approximately 5 markers easily selected by a rotary panel control.

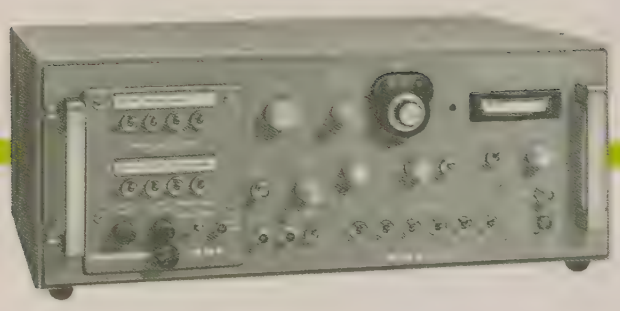
The pulse markers are developed from crystal circuits utilizing quartz crystal filters and are accurate to within ± 0. 05%. Each individual marker filter generates only one mark for the alignment display. It appears at the exact frequency selected, requires no counting, interpolation, estimating, etc. Each group of markers can be selected to completely define its bandpass object by the simple flick of a switch.

EXTERNAL VARIABLE MARKER

The 2-220 MHz variable marker is generated when an external CW oscillator is used. The variable marker is a "birdie pip" type of marker easily distinguishable from the fixed, pulse markers. A separate level control is provided for adjusting the size of the variable marker. All coupling is provided within the unit; and the variable marker, like the fixed markers, is completely isolated from the circuit under test. The low cost of the PCM-932 head makes it possible to keep supplemental frequency-marking units for important applications.

- FREQUENCY RANGE: **2 to 220 MHz**
- FIXED MARKERS: **30 sharp, crystal, pulse-type markers.**
- TYPICAL MARKER GROUPS: **Six groups of approx. 5 markers each. Up to 11 bands available.**

Marker Amplitude: Positive pulse continuously variable from 0 to 10 volts peak, approx.
Variable Marker: Provision for variable marker through use of an external CW oscillator.



154C 159C

WIDE-SWEEP AND MARKER GENERATORS

154C

- FREQUENCY RANGE: **50 KHz-110 MHz**
- SWEEP WIDTH: **50 KHz-110 MHz**
- RF OUTPUT: **1 V. rms into 50Ω, metered**

159C

- FREQUENCY RANGE: **1-300 MHz**
- SWEEP WIDTH: **200 KHz-300 MHz**
- RF OUTPUT: **0.5 V. rms into 50Ω, metered.**

154C and 159C

- SWEEP MODES: **Line lock, .01 to 1000 Hz manual, CW, external**
- HARMONIC DISTORTION: **>30 db down**
- SPURIOUS DISTORTION: **>30 db down**
- FLATNESS: **± 0.25 db over widest sweep.**
- MARKERS: **Up to 8 pulse or birdie markers per PM-7650 or PM-7660 plug-in.**
- HORIZ. OUTPUT: **Triangular with Trace—Retrace ratio continuously variable from 10:1 to 1:10.**
- EXTERNAL ALC CONTROL FOR CONNECTION OF ALC DETECTOR

Attenuator: 20, 20, 20, 10, 6, 3 db plus 3 db var. (6 db-159B).
Power Supply: 117 V. (± 10%), 50/60 Hz, 20 W. regulated.
Dimensions: 8" x 19½" x 13½".
Weight: 28 lbs.

These solid state, electronically swept units are WIDE-SWEEP (and marker) generators which cover their spectrum in a single frequency sweep. The additional features of continuously variable sweep width and continuously variable center frequency adapt these wide sweeps to excellent, stable, narrow-sweep generators, cover Video, IF and VHF in a single tuning range.

A multi-turn center frequency control provides exceptional fine touch setting of narrow sweeps, and a direct reading, digital, frequency dial.

OPERATING MODES

Performance characteristics include line lock, variable, CW, manual and external repetition rates. To assure an accurate, zero-voltage reference line on the scope, the RF output is blanked during retrace, if desired. A sawtooth sweep is generated, is separately available, and requires no phasing adjustments.

A front panel control provides for manual tracing of the frequency response display. It operates over the same range as the electronically swept mode of operation and permits tracing of the frequency response with point-by-point control. It may be used with the VTVM or frequency counter without changing the swept alignment set-up.

A rear panel control permits inversion of the sawtooth waveshape. In this manner, frequency sweeps from low to high or from high to low frequencies may be produced, as required. Provision for operation from external ALC detectors, (as in impedance plotter applications), is a standard feature provided on both units.

The 154C and 159C may also be operated as voltage controlled oscillators. The oscillators may be swept from external signal sources at repetition rates from DC to above 20 KHz, much higher at narrow sweep widths.

FREQUENCY MARKERS

Provision for a variable birdie-pip marker derived from an external oscillator is included on the sweep generator. A separate marker pip output is available for direct connection to the oscilloscope, by-passing the circuits under test. In addition, the PM-7650 and PM-7660 marker plug-ins offer birdie-pip and pulse markers to 300 MHz. Plug-in marker heads may be simply changed or added as required.

SWEPT OUTPUT

The RF output is AGC'd flat for amplitude linearity of better than ± .25 db over the widest range. Careful shaping of the electronic modulating circuits provide for controlled, meaningful frequency linearity. Distortion and spurious are minimal. The use of a broad output amplifier in these beat frequency units permits light coupling of the mixed oscillators, gives high output with superior waveshape.

PULSE TYPE MARKER PLUG-IN

The PM-7650 offers up to eight, optional, individually switched crystal pulse markers at customer specified frequencies between 1 and 100 MHz. These pulse markers are sharp and adjustable in height. Their width is a fixed fractional percentage of the total scope or recorder horizontal deflection and does not change with changes in sweep width. They remain narrow markers even on very narrow sweeps.

The pulse type markers are available from a separate output jack and can be fed directly to the Y axis or Z_4 (blanking marker), axis of a scope or graph. In addition, the pulse markers may be used as RF turn-off markers providing sharp absorptions in the RF output. Standard set of markers at 2-5-10-15-20-40-60-80 MHz is offered.

SINGLE FREQUENCY AND HARMONIC MARKER PLUG-IN

The PM-7660 offers individually switched, single frequency and/or harmonic birdie-pip markers between 0.5 and 300 MHz. Up to eight individual crystal oscillator markers can be ordered at customer specified frequencies. Up to seven harmonic markers can be ordered at a specified frequency and its harmonics. Single frequency and harmonic frequency markers can be combined in the same plug-in; the maximum number for the combination is seven. Standard set of harmonic markers at 1-2-5-10-20 MHz is offered. The individual marker oscillators are plug-in modules, and can be replaced or added as required.

The birdie-pip markers are shaped, beat note markers available at a separate output jack. They connect independently to the oscilloscope or recorder, bypass the circuit under test. As with the pulse markers, they will appear in traps and along the base line and cannot overload the circuits under test. They can be also used as internal markers to provide marker blips combined with the RF output.

PM7650B **PM7660B**

PM-7650B
Marker Plug-in .....
Pulse Marker to order .....
Standard "set" includes
2-5-10-15-20-40-60-80 MHz
Pulse Markers and Plug-in .....

PM-7660B
Marker Plug-in
Osc. Marker to order .....
Harmonic Marker to order .....
Standard "set" includes
1-2-5-10-20 MHz Harmonic
Markers and Plug-in .....

INTERNAL MARKERS

PULSE-TYPE MARKERS

SINGLE BIRDIE MARKERS

HARMONIC BIRDIE MARKERS

Frequency Range	Model No.	Sweep Width	RF Output	Flatness	Markers
20 Hz - 200 KHz	141D	20 Hz - 200 KHz	5 V., 600 Ω	±0.5 db overall	9 pulse-type at customer specified frequencies
50 Hz - 220 MHz	935C	50 Hz - 30 MHz	1 V., 70 Ω		7 pulse-type at customer specified frequencies
50 KHz - 110 MHz	154C	50 KHz - 110 MHz	1.0 V., 50 Ω metered	±0.25 db	PM-7650 or PM-7660
1 MHz - 300 MHz	159C	200 KHz-300 MHz	0.5 V., 50 Ω metered		
20 Hz - 1 GHz	1500C	0* - 500 MHz	0.5 or 1.0 V., 50 Ω metered	±0.5 db	PM-7631A PM-7632A PM-932B PM-861A
20 Hz - 1 GHz	860H	0* - 500 MHz	0.5 or 1.0 V., 50 Ω metered	±0.5 db	PM-861ASC
500 KHz - 1.7 GHz	121C	5 KHz - 500 MHz	0.5 V., 50 Ω metered	±.25 db to 800 MHz ±.5 db to 1.7 GHz	Birdie harmonic at 1, 10, 100 MHz or customer specified frequency.

SWEEP PLUG-INS

Frequency Range	Model No.	Sweep Width	RF Output	Flatness	Features
20 Hz - 200 KHz	PC-141B	0* - 20 KHz	1.0 V.rms	±0.5 db	Narrow sweeps; drift <3 Hz in one minute. Residual FM <0.2 Hz.
35 Hz - 600 KHz	PC-142B	0* - 20 KHz			
0* - 2 MHz	PC-130F	0* - 2 MHz			Narrow sweeps: wide sweeps to 2 MHz. Low drift and residual.
10 KHz - 20 MHz	PC-152B	10 KHz - 20 MHz			Wide video sweeps to below 10 KHz. Lin or log. High output.
50 KHz - 110 MHz	PC-154A	0* - 115 MHz		± 0.25 db	Wide sweep plug-in very flat; very low harmonics, spurious and residual.
2 - 32 MHz	PC-855B	0* - 800 KHz		±0.5 db	Narrow sweep. Residual FM <10 Hz below 35 MHz. One minute drift <25 Hz @ 3 MHz <70 Hz @ 30 MHz
10 - 120 MHz	PC-856B	0* - 1 MHz			
2 MHz - 220 MHz	PC-860E	10 KHz - 30 MHz			General purpose sweep. High level fundamental frequency output with excellent waveshape.
220 - 470 MHz	PC-867B	20 KHz - 470 MHz	0.5 V. rms		VHF-UHF sweep; fundamental frequency.
100 MHz - 1 GHz (Any Octave)	PC-123A	0.2% - Octave			Solid-state octave sweep with excellent full-width frequency linearity.
500 KHz - 1050 MHz	P-121A	35 KHz - 350 MHz		±0.25 db ±0.5 db	Electronic, wide-sweep, stable narrow sweeps.
900 - 1300 MHz	P-122B	200 KHz - 400 MHz			
100 - 1000 MHz (Any Octave)	P-123A	0.2% - Octave		±0.5 db	Solid-state octave sweep with excellent full width frequency linearity.
1.3 - 1.7 GHz	P-124A	500 KHz - 400 MHz			Electronic, solid-state, wide sweep.

*Residual

ER GENERATORS

	Features		Page
	Ultra-stable narrow sweeps, log or lin; manual, external modulation; synchronous detector; built-in attenuator, pulse markers.		4
	Single sweep from 10 MHz down to 1 KHz. 9 fundamental bands 10 to 220 MHz. Audio sweep. 7 narrow, fixed bands.		5
	Solid state, wide sweep; plug-in marker system. Sweeps full 100 MHz to low end 50 KHz. Pulse and harmonic markers.		14
	Similar to 154C solid-state sweep and marker system. Very flat, very low harmonics and spurious.		
	Sweep and marker plug-ins. Stable, narrow 20 Hz sweep widths; flat, wide 500 MHz sweeps. Pulse and harmonic markers.		6
	Sweep generator plug-ins as in 1500C. Slow sweeps, manual, ext. modulation.		6
	Solid-state electronic wide sweep and marker generator. Narrow sweep operation over 1700 MHz range.		18

LEGEND

- 154C and 159C Plug-ins
- 121C Plug-ins
- 1500C and 860H Plug-ins
- 1500C Marker Plug-ins

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MARKER PLUG-INS

Frequency	Model No.	Features		Page
10 KHz - 2 MHz	PCM-7631A	6 sharp pulse-type markers at customer specified frequencies.		12
1 KHz - 1 MHz	PCM-7632A			12
2 MHz - 240 MHz	PCM-932B	30 sharp pulse-type markers in groups. Customer specified.		13
200 KHz - 1 GHz	PCM-861A	Up to 6 crystal oscillator markers or 5 harmonic markers.		13
1 - 100 MHz	PM-7650B	Up to 8 crystal pulse markers.		15
.5 - 300 MHz	PM-7660B	Up to 8 crystal oscillator markers or 7 harmonic markers.		15

121C

WIDE SWEEP AND MARKER GENERATOR

- FREQUENCY RANGE:
  VHF: 500 KHz - 300 MHz
  UHF: 200 MHz - 1.7 GHz
  (P-121 - P-124 plug-ins)
- SWEEP WIDTH:
  VHF: 50 KHz - 300 MHz
  UHF: 5 KHz - 500 MHz
  (P-121 - P-124 plug-ins)
- FLATNESS: **±.25 DB to 800 MHz**
  ±.5 DB to 1.7 GHz
- HARMONIC & SPURIOUS CONTENT
  30 DB down.
- RF OUTPUT: **0.5 V. rms into 50 ohms, metered.**
- SWEEP MODES: **Line Lock**
  10 to 60 Hz, Manual, External
- MARKERS: **.005% xtal osc, birdie-pip harmonics of 1, 10, 100 MHz or to order. Provision for variable birdie.**
- ATTENUATORS:
  60 DB ROTARY — in 10 db steps.
  10 DB ROTARY — in 1 db steps (opt).
  PLUS VARIABLE 3 DB.

Sweep Output: Sawtooth, approx. 8 V. P/P
Power Input: 117 V. (±10%), 50/60 Hz, 60 W., regulated.
Dimensions: 19⅜" x 10⅞" x 16⅛".
Weight: 42 lbs.

The 121C is a solid-state, electronically swept VHF-UHF wide sweep and marker generator which accepts a variety of UHF plug-ins to provide extended frequency ranges and sweep widths. In this manner, it covers a range from 500 KHz to 1700 MHz, offers octave-wide sweeps even at low UHF frequencies where most generators in this range are limited to narrow widths, and provides for special applications such as VHF-UHF TV (440-920 MHz wide-sweep plug-in). The 121C delivers 0.5 volts rms into load – after a built-in attenuator – with excellent flatness and waveshape. It provides flat, wide sweeps and stable narrow sweeps; linear frequency output, agc'd rf level and a frequency marker system. A direct-reading 0-300 MHz digital frequency dial provides smooth center frequency control and remarkable vernier adjustment for narrow sweep operation.

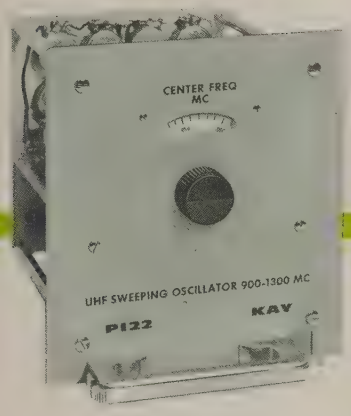
VIDEO-VHF OUTPUT

The video frequency output of the instrument is derived from a complete system of stable, isolated oscillators, (P-121 plug-in, u.s.o.), high frequency mixer and solid state output amplifier. The same agc'd output level of the UHF band, 0.5 V., is maintained over the video band. The buffered output eliminates the need for excessive padding under mismatch conditions. A solid-state 300 MHz wide video amplifier provides full 0.5 volts of video output from coupled oscillators. Careful shielding and light loading provides excellent video waveshape and the virtual elimination of spurious beats. A built-in attenuator and built-in detector add to the usefulness of the 121C.

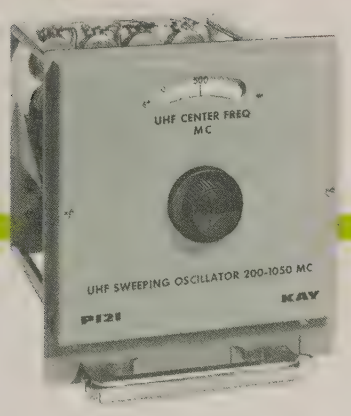
UHF OUTPUT

Rugged, stable, fundamental frequency UHF oscillators require no mechanical "doctoring", provide high level output while maintaining independence of load effects. The use of electronic modulating techniques provides for far greater control of the oscillator charac-

P-122B



P-121A



WIDE SWEEP PLUG-INS

teristics than is possible with inflexible mechanical devices. Both center frequency and sweep width are continuously variable. A vernier frequency control is provided for fine adjustment at narrow sweep width (operates at VIDEO BAND, also).

SWEEP RATE

The sweep voltages generated are sawtooth waveshapes and no phasing adjustments are necessary. Blanking of the rf output during retrace provides a true zero reference line. The internal sweep can be varied between 10 and 60 Hz or locked to line. External sweep signals can be used for repetition rates down to DC and up to well beyond 20 KHz. In this manner, voltage control of frequency is obtainable over the 121's entire frequency spectrum with control at any one setting covering the maximum sweep width.

FREQUENCY MARKERS

A harmonic generator, crystal controlled marker provides multiples of 1 MHz, 10 MHz and 100 MHz or at customer specified frequencies and provision is made for a variable marker controlled by an external oscillator. All markers are available at a separate output terminal and are isolated from the circuits under test.

RF OUTPUT VOLTAGE

The 121C generates 0.5 volts rms into load over its entire frequency range, with a fast-acting agc holding the output to superior flatness compared to other units of this type, including those restricted to video, only, or UHF, only. Precise 70 db step attenuators and a built-in detector are provided. Output voltage can be read directly on a built-in meter.

P-121A and P-122B

The P-121A and P-122B Plug-ins are fundamental frequency UHF sweep generators designed for use in the 121C sweep and marker generator basic rack unit. Both plug-ins cover a wide UHF range in one continuous sweep or function as narrow sweep generators with continuously variable center frequency range and sweep width. A direct reading frequency dial indicates center frequency over the one-band tuning range. The rf output is held constant over the entire range of these plug-ins by fast-acting AGC circuits, providing excellent waveshape and virtually eliminating harmonic and spurious products. The UHF output of the P-121A is used to develop the full 50 KHz to 300 MHz VHF range of the standard 121 unit.*

*On request, a 121C unit modification provides VHF output using the P-122B and P-123A plug-ins. Above 750 MHz, P-123 plug-ins provide VHF sweeps from standard 121's.

P-121

- FREQUENCY RANGE:
  UHF: 200 MHz - 1050 MHz
- SWEEP WIDTH:
  UHF: 5 KHz - 50 MHz at 220 MHz
  25 KHz - 225 MHz at 500 MHz
  35 KHz - 350 MHz at 800 MHz
- FLATNESS:
  UHF: ±0.25 DB to 800 MHz
  ±0.5 DB to 1050 MHz

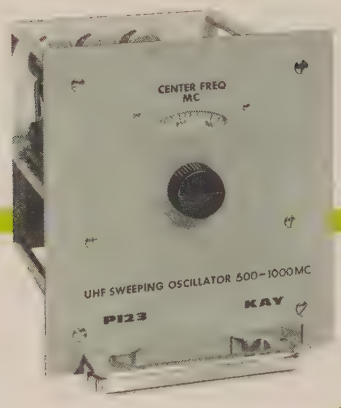
Weight: 8 lbs.

P-122

- FREQUENCY RANGE: **900 - 1300 MHz**
- SWEEP WIDTH: **200 KHz - 400 MHz**
- FLATNESS: **±0.5 DB**

Weight: 4½ lbs.

P-123A



P-124A

WIDE SWEEP PLUG-INS

P-123A (PC-123A)

The P-123A is a solid-state, octave-sweeping VHF-UHF sweep generator plug-in providing stable fundamental frequency output. It provides frequency sweeps from 100 to 200 MHz, 500 to 1000 MHz, etc., which are frequency linear to better than 1.1 to 1. The RF output over the range is held constant by a fast acting AGC circuit, provides excellent waveshape and is completely free of spurious products.

SELECTED FREQUENCY RANGE

The frequency range of the P-123A is limited to any single octave anywhere in the range from 100 to 1000 MHz. While many applications will be met by the general 100 to 200, 200 to 400, 300 to 600, and 500 to 1000 MHz ranges; any other octave range may be ordered. The P-123A covers its selected octave in one tuning range with a direct reading frequency calibrated dial. Over its range, the P-123A generates an RF output of 0.5 volts rms into 50 ohms and AGC holds maximum full octave amplitude variation to less than ± 0.5 db (after built-in attenuator). Sweep width is continuously variable from octave to less than 0.2% of full sweep width.

VOLTAGE-TUNED OSCILLATOR

The P-123A is a voltage tuned oscillator whose wide range, dc coupled modulating circuits respond to external voltage control over a DC to 20 KHz frequency range.

FITTED FOR OTHER SYSTEMS

Similar to the P-123A in characteristics and features, the PC-123A is fitted for the 1500C sweep and marker generator and the 860H sweep generator. In the 1500C it works in conjunction with the PCM-861 marker generator plug-in which provides both crystal CW and crystal harmonic frequency markers throughout the frequency range.

P-124A

With the new P-124A Plug-in, the frequency range of the 121C is extended to 1700 MHz. The solid-state P-124A covers its entire range in a 400 MHz wide sweep. The fundamental frequency 0.5 V. rms output is held constant by fast acting AGC circuits.

P-123

- FREQUENCY RANGE: **Any single octave between 100-1000 MHz**
- SWEEP WIDTH: **.2% to octave**
- FLATNESS: **±0.5 DB**

Weight: 4½ lbs.

P-124

- FREQUENCY RANGE: **1.3 GHz - 1.7 GHz**
- SWEEP WIDTH: **500 KHz - 400 MHz**
- FLATNESS: **±0.5 DB**

Weight: 4½ lbs.

5070B

SOLID STATE PULSED RF SIGNAL GENERATOR

The 5070B is a fully transistorized instrument designed as a pulsed carrier generator. The pulsed output provides sharp rise and decay, and flat tops. The unit will also serve as a CW generator, as well as a video pulse generator. It provides a stable CW signal from 10 MHz to 120 MHz continuously variable in five overlapping bands. The direct reading frequency dial is calibrated to ± 1%.

100 ns TO 100 us PULSE GENERATOR

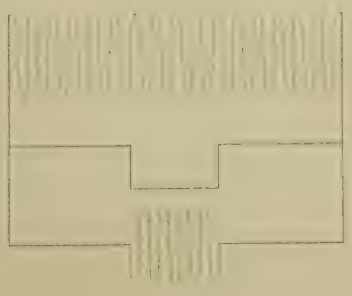
The video pulse generator incorporated in the 5070B provides pulses with a wide range of continuously variable pulse widths from 100 ns to 100 us with less than 20 ns rise and decay times. Pulse repetition rates are continuously variable from 40 to 6000 pps. The pulses may be triggered either by the internal multivibrator or an external source of only 2 volts. Maximum output is plus or minus 3 volts into a 50 ohm load. A sync pulse is supplied which precedes the output pulse by approx. 40 ns.

10 ns RISE, 80 DB OFF

The combination of oscillator and pulse generator with a diode switch and carefully buffered output stages provides a pulsed rf output. The features of flat, pulsed rf, continuously variable frequency, sharp 10 ns rise and decay time, and low leakage provide for reliable and accurate measurements. The rf output is held at the same peak levels during either CW or pulsed rf operation. The carrier pulses are flat (including overshoot) within ±5% and the rise and decay times are less than 10 ns. Maximum output is 0.5 V. rms into 50 ohms. The off level is greater than 70 db (to 85 db) below the carrier level at all frequencies within the normal range of the instrument. The diode switch, in addition to being driven from the internal oscillator and pulse generator, can be driven by an external pulse source and/or an external rf source.

- CARRIER FREQUENCY: **10 to 120 MHz.**
- DIAL ACCURACY: **±1%.**
- CARRIER-OFF LEVEL: **85 DB to 30 MHz**
  80 DB to 70 MHz
  70 DB to 120 MHz
- RISE AND DECAY: **Pulsed RF < 10 ns**
  Video pulse < 20 ns
- PULSE REPETITION RATE:
  50 to 5000 pps
- PULSE WIDTH: **100 ns to 100 us.**

Attenuator: 101 db in 1 db steps plus approx. a 6 db continuous variation.
Sync Output: 2.5 V. peak into 50 ohms with 20 ns rise time. Sync pulse precedes output pulse by approx. 40 ns.
External Trigger Input: Approx. a +2 V. pulse required.
Power Supply: 117 V. (± 10%), 50-60 Hz, 15 W., regulated.
Dimensions: 8" x 19½" x 13½".
Weight: 29 lbs.



1484A

LOW COST, SOLID-STATE PRODUCTION SWEEPS

The 1484A offers premium sweep and marker characteristics at low cost in a solid-state limited range (e.g., 10.7 FM, 45 MC TV, 88-108 FM, 12 MC Comm., etc.) production oriented unit. Frequencies may be selected up to 1 GC and pulse markers, CW and harmonic birdie markers, RF turn-off markers and post-injection markers can be specified. A four position band switch selects portions of the band as desired and remote control of bands and tuning can be provided.

Solid-state, durable, epoxy, printed circuit modules allow easy maintenance and inspection. The 1484A is contained in a compact cabinet for portability.

SWEEPS

- 10.7 MHz FM — IF
- 45 MHz TV — IF
- 88 — 108 FM
- 12 MC COMM
- OTHERS TO 1 GHz

MARKERS

- PULSE MARKERS
- RF TURN-OFF MARKERS
- POST-INJECTION MARKERS
- CW BIRDIE MARKERS
- HARMONIC BIRDIE MARKERS

- COMPACT
- PRINTED CIRCUITS
- BUILT-IN ROTARY ATTENUATORS

Attenuators: 0-10 db in 1 db steps—
0-33 db in 3 db steps—
0-60 db in 10 db steps—

Marker Systems to Customer's Specifications (Opt.)

1483B

UHF-TV SWEEP

The new 1483B is a solid-state sweep and marker generator, used to design, test, and align UHF-TV receivers. It develops a full 0.5 volt rms output into load over the entire channel 14 to 83 frequency range. A front panel control permits switching of the sweep width from a wide 520 MHz (entire UHF-TV band) to continuously variable widths from 60 down to 5 MHz.

Channels 14 and 83 are provided at two separate switch positions, allowing easy selection of the extreme ends of the UHF band. Single or harmonic frequency birdie marker modules are available at customer specified frequencies. A variable marker input is provided. Provisions have been made for the use of two, optional, precise rotary attenuators. The attenuation ranges available include 0-10 db in one db steps, 0-33 db in 3 db steps, and 0-60 db in 10 db steps.

- FREQUENCY RANGE: **440-960 MHz**
- SWEEP WIDTH: **Wide: 520 MHz**
  Narrow: 5-60 MHz
- BIRDIE MARKERS
- BUILT-IN ATTENUATORS

3092A

COMPACT SOLID-STATE SOUND-PIX MODULATOR

- FREQUENCIES: **TV-RF Sound and Pix—Choice of Channels 2-13**
- SOUND-PIX CARRIER OUTPUT: **.25V into 75 Ohms**
- PIX CARRIER MODULATION PERCENTAGE: **Variable to 90%**

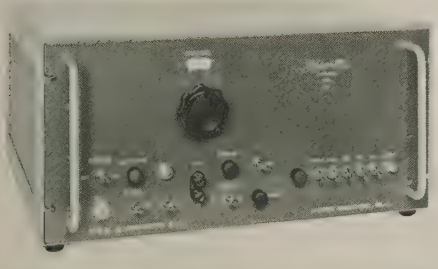
Sound carrier deviation: Variable 0—± 25 KHz

Sound Modulating Frequency: 400 Hz or external audio 2.0V RMS for ± 25 KHz deviation.

Power Requirements: 117V, 50/60 cps
Dimensions: 10″ x 7″ x 13″
Weight: 22 lbs.

The new model 3092A is a completely transistorized single channel sound-picture generator designed for the rapid, production-line testing of television receivers. It may also be used as a transmitter in closed circuit systems, such as community television. When supplied with a standard television video signal, it will provide a modulated picture carrier suitable for use as a final "aircheck" signal on the desired channel.

The 3092A develops separately the crystal-controlled RF sound carrier and the crystal-controlled RF picture carrier on the specified channel by using isolated video and audio sections with independent oscillators and multipliers, all possibility of interaction between picture and sound carriers is eliminated.



12-CHANNEL TV SOUND-PICTURE GENERATOR

The Mega-Pix develops separately the crystal-controlled rf sound carrier and the crystal-controlled rf picture carrier on each TV channel. An externally supplied video signal may be used to modulate the picture carrier on a double sideband basis. The sound carrier is modulated with an internally generated 400 Hz tone or by an external audio signal.

COMPLETE DESCRIPTION ON PAGES 14 AND 15

154C

- FREQUENCY RANGE: **50 KHz-110 MHz**
- SWEEP WIDTH: **50 KHz-110 MHz**
- RF OUTPUT: **1 V. rms into 50Ω, metered**

159C

- FREQUENCY RANGE: **1-300 MHz**
- SWEEP WIDTH: **200 KHz-300 MHz**
- RF OUTPUT: **0.5 V. rms into 50Ω, metered**

792A

SOLID STATE AUTOMATIC NOISE FIGURE METER

Tuned input amplifier is continuously variable from 10 to 120 mc to give quick and easy operation with almost all receivers. External, hot wire noise source gives low VSWR from 10 to 900 mc, and precisely known noise output, so that overall system accuracy is less than ± 0.5 db.

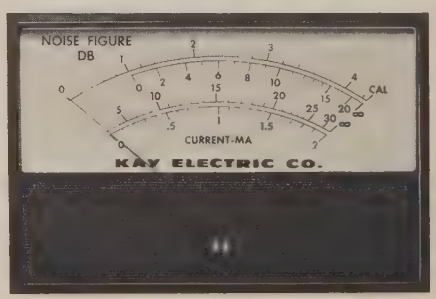
The 792A offers variable impedance and balanced outputs, provides complete measurements up to 26.5 gc. It offers carefully metered noise figure ranges of 5 to 30 db for waveguide and diode sources; 0 to 20 db for hot wire and diode sources. Infinity is marked. Either 6 db or 15.2 db excess noise can be selected for maximum accuracy at either high or low noise figures.

The 792A offers a wide operating range of input noise levels, 75 dbm to 0 dbm for a nominal 1.0 mc bandwidth. It requires only 33 db of external gain between its IF input and its lowest output noise source. Switched, panel-controlled attenuation of 41 db in one db step and a highly effective AGC with a dynamic range of 40 db are provided. To accommodate long term variations in system gain, a self-calibrating feature is included. Manual operation including a variable gain control is front panel selected.

- NOISE FIGURE RANGE:
  0 TO 20 DB*:
  Noise Reference: 6 DB (hot wire)
  Accuracy: ± .5 DB
- INPUT FREQUENCY:
  10-120 MHz Continuous Coverage
- BANDWIDTH: **Approx. 4% of Center Frequency**
- INPUT SENSITIVITY:
  0 to 75 DBM (Noise source on).
  Approx. 35 DB gain required between lowest noise source and input.

Input Impedance: 50 ohms nominal
Input Attenuator: Steps of 20, 10, 5, 3, 2, and 1 db.
Power Input: 117 V. (± 10%), 50/60 Hz, 10 W.
Dimensions: 19" x 7" x 13½".
Weight: 22 lbs.

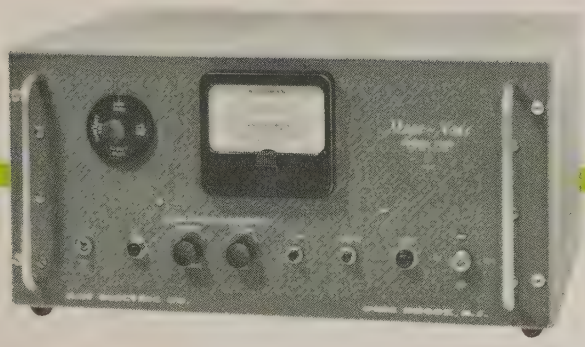
*Indication to infinity.



792-AFE Automatic Noise Figure Meter

780

403A 240B



The Mega-Nodes are calibrated random noise sources providing output over a wide frequency and power range. They employ noise diodes with tungsten filaments as temperature-limited noise generators.

EASE OF OPERATION

The plate voltage of the noise diode is regulated and the diode plate current, (proportional to noise power output), is variable by a front panel control. A calibrated meter provides direct reading in noise figure. The ability to vary the noise output in an accurately known way, greatly simplifies the measurement process since it permits precise matching of circuit noise rather than a more complicated referencing back to some fixed output.

MEGA-NODE 780

- FREQUENCY RANGE: **1 MHz to 3000 MHz**
- OUTPUT IMPEDANCE: **Nom. 50 ohms**
- NOISE FIGURE RANGE: **0 to 20 DB**
- METER CALIBRATION: **Logarithmic in db noise figure. Linear in DC ma.**

Power Supply: 117 V. (±10%), 60 Hz, (50 Hz on request), 200 W., regulated.
Dimensions: 19½" x 9¼" x 13¼".
Weight: 47 lbs.

MEGA-NODE 403A

- FREQUENCY RANGE: **3 - 500 MHz**
- OUTPUT IMPEDANCE: **50 ohms**
- NOISE FIGURE RANGE: **0 to 19 DB**
- METER CALIBRATION: **Logarithmic in db noise figure. Direct reading in two ranges (0-9 and 8-19).**
- VSWR: **Less than 1.2 over entire frequency range.**
- ACCURACY: **±0.5 DB over entire frequency range and over entire dial scale.**

Power Supply: 117 V. (±10%), 60 Hz, (50 Hz on request), 50 W., regulated.
Dimensions: 19¼" x 10¾" x 9½"
Weight: 30 lbs.

MEGA-NODE 240B

- FREQUENCY RANGE: **5 to 220 MHz**
- OUTPUT IMPEDANCE: **Unbalanced 50, 75, 150, 300 ohms, infinity; balanced 100, 150, 300, 600 ohms, infinity.**
- NOISE FIGURE RANGE: **0 to 16 DB at 50 ohms; 0 to 23.8 DB at 300 ohms.**
- METER CALIBRATION: **Logarithmic in db noise figure. Linear in ma DC.**

Accessories Supplied: 1 adapter, coax. fittings to twin lead for balanced output; 1 adapter, coax. fittings to unbalanced pair for unbalanced output.
Power Supply: 117 V. (±10%), 60 Hz, (50 Hz on request), 50 W., regulated.
Dimensions: 19¼" x 10¾" x 9½".
Weight: 30 lbs.

1022A
1023A
1024A

These solid-state video amplifiers include two wideband models with excellent gain-bandwidth characteristics, (40 db - 150 MHz, 30 db - 300 MHz), and a high output 8 MHz unit delivering 15 volts rms into 50 ohms. Each of these amplifiers has unusually flat response over its full frequency range. Each is designed for accurate input and output impedances of 50 ohms, but can operate an accessory probe to provide amplification from high-impedance outputs without loading down the test signals.

The 1023A and 1024A offer low noise figure and excellent pulse response in compact, low power units. As a general purpose laboratory test amplifier, the 1024A features a full 300 MHz wide passband, eliminating the need for adjustment or tuning. It provides a stable 30 db of gain matched to 50 ohms, and a maximum output of 0.5 volts. Short rise time of 1.5 ns, together with a minimum of overshoot, assures undistorted amplification of fast pulses. The 1023A provides 40 db of gain over 150 MHz. It includes a 3 step attenuator to provide flat, wide frequency gain in 5 db steps. Both 1023A and 1024A units are very useful pre-amps for frequency counters, oscilloscopes, etc.

The 1022A with its high output into 50 ohms is particularly suited for video distribution systems and for use with video sweep generators in developing large test signals for sweeping very lossy filters.

In all units, carefully designed feedback circuits and power supplies assure excellent gain stability. Signal to noise ratios are also excellent.

For high impedance applications, the 965A broadband probe is designed for operation with these 50 ohm input amplifiers. See following page for probe specifications.

1022A

- FREQUENCY RANGE: **50 KHz to 8 MHz**
- GAIN: **34 ± 1 DB, at 1 MHz**
- FLATNESS: **± 0.25 DB over entire range**
- MAX. OUTPUT LEVEL: **15 V. rms into 50 Ω load**

Input & Output VSWR: Less than 1.2:1
AC Input: 117 V. (±10%), 50-60 Hz
Dimensions: 19" x 8¾" x 15"
Weight: 18 lbs.

1023A

- GAIN: **40 DB ± 1 DB**
- FREQUENCY RESPONSE: **1 KHz - 100 MHz, ± 0.5 DB**
  1 KHz - 150 MHz, ± 1.0 DB
- ATTENUATOR: **5, 10, 20 DB**

Max. Output Voltage: 1.4 V. p/p into 50 ohms
Equivalent Wideband Input Noise Level: Less than 40 μv
Input Impedance: 50 ohms
VSWR: 1.3 to 150 MHz
Power Supply: 117 V. (±10%), 60 Hz, 12 Watts, regulated.
Dimensions: 7¾" x 4¾" x 5¾"
Weight: 5½ lbs.

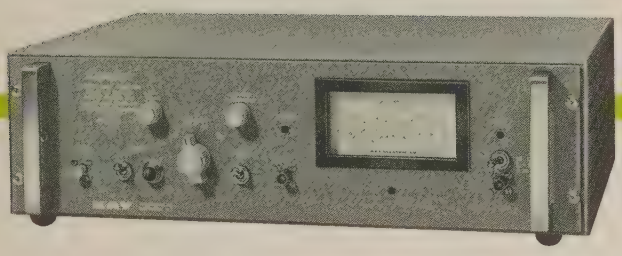
1024A

- GAIN: **30 DB ± 1 DB**
- FREQUENCY RANGE: **200 Hz to 300 MHz**
- FLATNESS: **± 0.5 DB, 1 KHz - 300 MHz ± 3 DB, ± 3 DB, 200 Hz - 300+ MHz**
- RISE TIME: **Approx. 1.5 ns.**

Max. Output Voltage: 1.4 V. p/p into 50 ohms
Equivalent Wideband Input Noise Level: Less than 40 μv
Input Impedance: 50 ohms
VSWR: 1.3 to 150 MHz, 1.5 to 300 MHz
Power Supply: 117 V. (±10%), 60 Hz, 12 Watts, regulated.
Dimensions: 7¾" x 4¾" x 5¾"
Weight: 5½ lbs.

1025B

965A



The 1025B gives overall response, and at the same time gives detailed, easily seen measurements of points on the curves as far down as 80 db. The unit permits highly accurate viewing of the skirts and sharp slopes of bandpass filters, single side-band filters, traps, etc. A control gives expansion of the top critical points simultaneously with the log display. 80 db log range, also available as undetected RF signal.

The 1025B is a "setup" type of unit, providing internal switching to set up either the full band of 20 KHz to 220 MHz, or a faster responding band of 200 KHz to 220 MHz. The low, 20 KHz bottom limit of the full range band imposes a slower time constant on the log system; and the choice of bands is provided for easiest operation. Both bands are designed primarily for use in sweep generator or steady-state applications, and accurately log any accurately presented swept-frequency response. The 1025B is not intended for fast pulse log applications. The Logafier provides its accurate, 80 db log range over a full 20 KHz to 220 MHz flat, broad, frequency band. In addition, the 80 db log range is available as undetected RF signal as well as detected or metered. The 1025B functions as a true linear RF amplifier to provide 52 db of gain over its full frequency range. When used with a sweeping oscillator equipped with a manual sweep control, the panel meter can be utilized as an accurate db reading voltmeter easily correlated with frequency counter measurements.

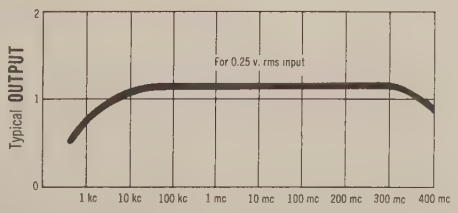
- FREQUENCY RANGE: **20 KHz to 220 MHz**
- FLATNESS: **500 KHz to 100 MHz, ±.5 DB**
  20 KHz to 220 MHz, ±1.0 DB
- LOGARITHMIC ACCURACY: **± 2 DB**
- DYNAMIC RANGE: **Full scale 40, 60, or 80 DB**
- INPUT SIGNAL: **0.5 Volts for 80 DB**
  0.16 Volts for 60 DB
  0.05 Volts for 40 DB

Top Expand Control: Variable over 0 to 10 db range.
Input Impedance: 50 ohms, equipped for 965A high impedance probe.
Output Load: 50 ohms
Dimensions: 5½" x 12½" x 19"
Weight: 23 lbs.

965A

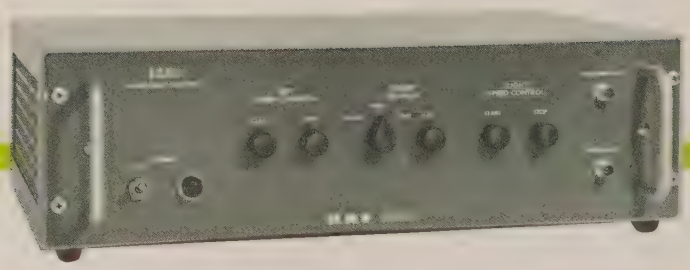
The 965A broad band, low-loss probe offers a high impedance connection to any 50 ohm input. It is designed particularly to operate with the Kay 792A Noise Test Set, 1025B Log Amplifier and the 1024A Wide Band Amplifier. Connection of these broadband, 50Ω inputs can easily be made to high impedance points in amplifiers and to the outputs of high impedance filters.

- TYPICAL INPUT R: **35K at 10 MHz**
  20K at 100 MHz
  2K at 200 MHz
- TYPICAL INPUT C: **3.5 μμf at 100 MHz**
  4.0 μμf at 200 MHz



Max Input Voltage: 1.0 V. rms
For 1.0 volt input; typical attenuation is:
6 db at 100 MHz, 10 db at 200 MHz

8040A
8050A



SOLID-STATE SWEEP VOLTAGE GENERATORS

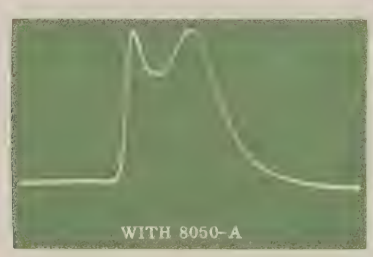
The 8050A is a solid state sweep voltage generator designed for use with most Kay sweep generators in adapting the swept frequency output to the requirements of the circuit under test. It provides control over the rate of change, frequency per unit time.

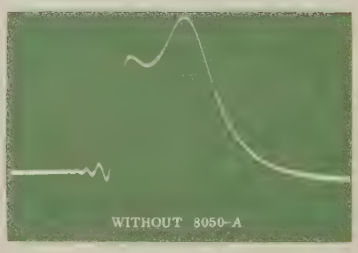
Individual Start-Stop controls on each of two separately adjustable slow sweep segments, permit the use of a slow sweep in areas where ringing may occur, but maintain an easy to use fast sweep over the remainder of the frequency swing. The 8050A also provides for expanded viewing of sharp slope areas. Selected areas can be "blown-up" in relation to the rest of the trace.

The 8050A eliminates the necessity of sweeping overall passband characteristics of the slow rate determined by its critical areas e.g., a sharp slope or trap. The usual faint oscilloscope trace provided by very slow sweeps can be avoided. Higher repetition rates over most of the band provide a bright trace. In the areas of slow rate, the oscilloscope beam is automatically held in place longer, providing an additional intensification of brightness.

- SWEEP RATES:
  Without slow rate segments:
  Fast: 10 to 200 Hz
  Med: 2 to 30 Hz
  Slow: .2 to 4 Hz
  With full slow segments:
  Slow: 25 seconds for each sweep
- SWEEP VOLTAGE: **—4 to +4 V., at 4500 Ω**
- BLANKING VOLTAGE: **Separately available for sync or blanking: 12 V. offset to —2 V., at 3000 Ω.**

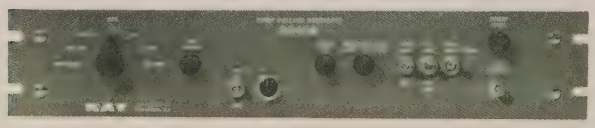
Dimensions: 5¼" x 19"
Power: 117 V. (± 10%), 50/60 Hz, 5 watts
Weight: 14 lbs.





8040A

The 8040A is a solid state sweep voltage generator which provides triangular waveshapes continuously variable between .01 and 100 Hz in six overlapping ranges. It can be used with most Kay sweep generators to provide very slow sweeps and a "one-shot" start-stop single sweep for use with recorders, storage scopes, etc. Symmetrical waveshape provides equal time low-high and high-low (retrace) frequency sweeps, provides bright, coincident displays from Kay voltage-tuned capacitance sweeps. A manual sweep is provided.



- SAWTOOTH OUTPUT: **0 - 10 V. p/p zero symmetry**
- OPERATING MODES: **.01 - 100 Hz in six overlapping bands**
  Manual
  "One Shot" sweep (positive or negative going)

Dimensions: 3½" x 19"
Weight: 10 lbs.

997A 990A 255B

997A

The 997A RF Detector is a compact, DC to 1300 MHz unit offering flat response and low VSWR. A unique mechanical arrangement permits simple reversing of the crystal. Either positive or negative polarity outputs may be measured without being subject to the different characteristics of two separate crystals. Conversion efficiency to approximately 0.8 at 1.0 volt input.

- INPUT IMPEDANCE: **50 ohms**
- FREQUENCY RANGE: **0.1 - 1300 MHz**
- VSWR: **1.15:1**
- MAX. INPUT VOLTAGE: **3 V. rms**
- TYPE OF DETECTION: **Half-wave**
- OUTPUT POLARITY: **Negative or positive**

Connectors: BNC
Case Dimensions: 1¾" x ¾" x ¾"
Weight: 3 oz.

The 990A is a small, compact utility cw oscillator which provides continuous coverage between 4.5 and 220 MHz in six switched ranges. The direct-reading frequency dial is hand calibrated, and the amplitude of the high-level cw output is held constant to within ±0.5 db over the entire frequency range by a fast-acting AGC circuit similar in design to the circuits used in our sweeping oscillators. A built-in, precision step-attenuator and metered output permit accurate quantitative measurements. The small size and the high-level output make the Utilator a very versatile production-line or laboratory tool.

Power Supply: 117 V. (±10%), 50/60 Hz, 50 watts, regulated.
Dimensions: 11" x 6½" x 8½"
Weight: 19 lbs.

990A

- FREQUENCY RANGE: **4.5 to 220 MHz in six overlapping bands**
- RF OUTPUT: **1 V. rms into 50Ω, metered**
- FLATNESS: **±0.5 DB over the entire range**
- ATTENUATORS: **Switched steps of 20, 20, 10 and 6 DB, plus variable 6 DB**

255B

- FREQUENCY RANGE: **DC to 1000 MHz**
- VSWR: **DC to 500 MHz — less than 1.15:1**
  500 to 1000 MHz — less than 1.4:1
- CROSSTALK: **Down more than 70 DB, (measured at 200 MHz)**
- SWITCHING RATE: **With external sync, 0.2 - 100 Hz;**
  With internal sync, 5 - 100 Hz
- IMPEDANCE: **50 ohms**

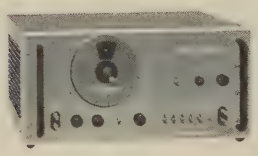
Power Input: 117 V. (±10%), 50/60 Hz, 8 watts.
Dimensions: 11½" x 8" x 6½"
Weight: 11 lbs.

Essentially, the 255B provides a high frequency DPDT coaxial switch whose rate of switching can be set by an internal generator or can be locked to an external sync signal. A phase shift control is included so that the starting point of the switching action can be varied.

In general, any application which can benefit by a "simultaneous" display, by the continual referencing of one significant characteristic vs. another; by the action, that is, of an automatic switch with superior switching, range, and control can profitably employ the 255B.

One application, for example, involved a go; no-go test of oscillator FM'ing. Here, the 255B switched between a 300 MHz oscillator and two standard oscillators 500 KHz above and below 300 MHz. The output of the 255B fed an FM receiver with its discriminator output driving a DC scope. The scope displays showed two frequency tolerance calibration lines and a moving line which monitored the FM'd oscillator. A very frequent application uses the 255B in frequency alignment. Here the 255B switches between full oscillator output and attenuated oscillator output. The scope display shows the frequency characteristic curve with a calibrating reference line superimposed on it. All circuits in the unit are solid state.

The following units have been described in detail in the previous
For current information, please use reply card.



385A

1-260 MHz Fixed-Band Sweep and Marker Generator

The 385A is a wide-range, all-electronic sweep generator, with center frequencies and marker frequencies furnished as specified by the customer. The swept frequency spectrum is covered in six switched bands. Fundamental frequency sweeps on all bands assure stable operation that is free of spurious outputs. A wide range of pulse-type, crystal-controlled frequency markers can be furnished.

Frequency Range: 6 switched bands between 1 and 260 MHz as specified by customer

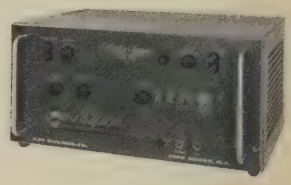
Sweep Width: 60% of center between 1 and 100 MHz; 60 to 70 MHz between 100-260 MHz

RF Output: 0.5 v. rms into load

Flatness: ± 0.5 db overall

Markers: up to 30 crystal-controlled, pulse-type markers to order

Weight: 34 lbs.



150B

20 MHz Sweep and Marker Generator

The 150B is a sweep and marker generator designed for testing video amplifiers. Three switchable, swept frequency ranges (50 KHz- 5 MHz, 50 KHz-10 MHz, and 50 KHz-20 MHz), are available. Six pulse-type, individually switched frequency markers are positioned at 1, 2, 5, 10, 15, and 20 MHz. In addition, a variable pulse-type marker may be formed using a video oscillator.

Frequency Ranges: 3 switched bands —
50 KHz-5 MHz;
50 KHz-10 MHz;
50 KHz-20 MHz.

Sweep Width: Entire width of band in use

RF Output: 0.2v. rms into load; flatness: ± 0.5 db overall

Markers: 6 sharp pulse-type markers

Weight: 41 lbs.

MODEL NO.	DESCRIPTION
110A Mega-Sweep	50 KHz to 950 MHz sweeping oscillator
111A Mega-Sweep	10 to 950 MHz. Higher output 110A
153B Marka-Sweep	50 KHz to 50 MHz sweep and marker generator
156A Multi-Sweep	1 to 300 MHz wide sweep
181A Mega-Match	10 to 1000 MHz VSWR indicator
254TX Mega-Switches	RF Toggle Switches
361C Marka-Sweep	TV sweep and marker generator
370A Marka-Sweep	20 to 50 MHz
380A Rada-Sweep	30 to 60 MHz fixed-band sweep and marker generator
386 Rada-Sweep 300	1 to 350 MHz fixed-band sweeping oscillator with frequency markers
386AN Rada-Sweep	Air receiver Rada-Sweep 300
386AR Rada-Sweep	Rapid alignment of AM and FM radios
400A Megaligner	19-49 MHz in two bands

MODEL NO.	DESCRIPTION
420A Dual Mega-Marker Sr.	Channels 2-13, 43.5 MHz IF
511A Radaligner	15-80 MHz sweep and marker generator
600A Rada-Node	Noise figure meter
620A Gain Set	Precise IF gain and loss measurements
625A Gain Set	Precise IF gain and loss measurements
770 Therma-Node	1 KHz to 1 GHz heated element noise source
865A Vari-Sweep	10 to 135 MHz 866A
932A Ligna-Sweep	AM-FM and TV sweep
932B Ligna-Sweep	Video-VHF sweeping oscillator with crystal controlled marks
951A Microlter	50 MHz VTVM and video amplifier
971C Transalyzer	50 KHz to 50 MHz transistor analyzer
7630A Vari-Marker F	Accessory marker unit

Please send catalog covering Kay's:

- ☐ Sweep & Marker Generators
- ☐ Audio Spectrum Analyzers
- ☐ Attenuators

To:

Name_____

Department_____

Firm_____

Address_____

City and State_____ Zip_____

Remarks_____

Complete Alignment System

A continuously variable center frequency from 4-120 MHz with a direct-reading, individually calibrated frequency dial; continuously variable sweep widths from kiloherz up to as much as 40 MHz; a continuously variable frequency marker from 2-135 MHz with a separate direct-reading, individually calibrated frequency dial. This is a pip-type marker combined with the sweeping oscillator output within the unit. No external coupling is required.

Frequency Range: 4 to 120 MHz in 6 overlapping bands

Sweep Width: 60% below 50 MHz; 30 MHz above 50 MHz

RF Output: 1 v. rms into load

Flatness: ± 0.5 db

Fixed Markers: 11 pulse-type markers to order

Weight: 49 lbs.

MEGA-CHARTS

	Prices:
Form 82 BSPR — VSWR's from 1 to infinity. Form 82 SPR — VSWR's from 1 to 1.585 (4 db). Form 82 ASPR — VSWR's from 1 to 1.122 (1 db). Printed on 8½" x 11" translucent master sheets.	100 — $ 3.75 200 — $ 7.00 500 — $14.00 1000 — $25.00 2000 — $47.00
Laminated to thickness of 0.030" with frosted plastic for erasible pencil markings.	Prices: 1 — $ 3.00 10 — $ 25.00 50 — $100.00

ORDERING INFORMATION

...ders and quotation requests may be sent ... the offices listed on the following page or ...to our main office in Pine Brook, New Jersey, ...West Coast office in Goleta, California. Terms ... 30 days; Cash Discount ½% 10 days. Re...nt parts are net only. Shipments are made ... account where credit has been established, ...payment in advance when offered, or C.O.D. ...uoted are Net and FOB Pine Brook, New ...FOB prices overseas are available from over...ces listed. U.S. funds are required for pay...

...al instrument prices include a Standard Cabinet and Operating and Maintenance Manuals describing the equipment. Most KAY instruments may be removed from the cabinet for rack mount operation. Characteristic impedances specified in the catalog are standard; however, other impedances are available with most instruments on request. Most attenuators are available in 50, 70 or 90 ohm impedances. Power supplies are arranged for 117 Volt operation, line frequency specified. In many instances, these supplies can be modified to suit your needs at no additional cost.

Prices and specifications are subject to change without notice. Minimum order is $10 (for orders of less than $10, add $1 for handling). Instruments are individually packed and shipped via Railway Express unless otherwise requested.

WARRANTY

Each new instrument manufactured and/or sold by us is warranted to be free from defects in material and workmanship. Our responsibility is limited to repairing (or replacing) any instrument or part thereof (except tubes) for a period of one year when, in our opinion, the repair or replacement is covered by this warranty. Tubes are warranted for a period of three months from date of shipment against failure because of defective material.

REPAIRS

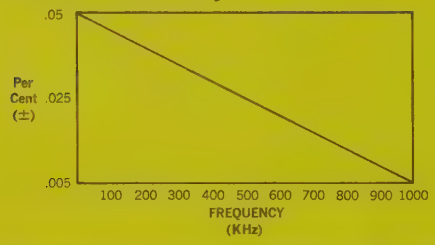
A stock of spare parts is maintained and is available to our customers. The factory will repair at no charge equipment which, in our opinion, is covered by our warranty; and at standard rates in cases which, in our opinion, are not covered by our warranty. Permission to return equipment should in every case be obtained from the factory before equipment is returned.

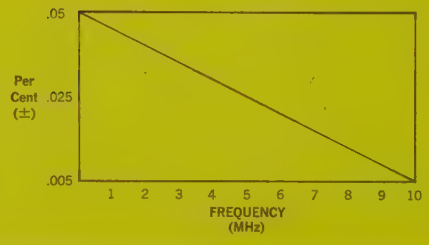
Unless instructed otherwise, repairs less than 20% of unit cost (or $60), are accomplished and billed without *specific* price authorization. A service facility is maintained in California to facilitate repairs in the West. Shipping Address: 820 Wallace Becknell Road, Santa Barbara Airport, Goleta, California.

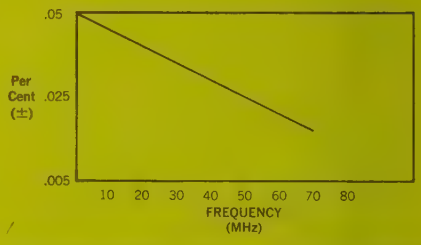
NEW
PM-10 Marker Plug-in

- Variable Pulse Type Marker
- Direct Reading Frequency Dial
- Position Pulse for Band Pass Marking
- Cycles, Wide; Cycles, Spaced

Marker Accuracy







KAY ELECTRIC COMPANY

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(219) 272-2848

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*Shipping Address: 820 Wallace Becknell Road, Santa Barbara Airport, Goleta, California

6349-50M-667

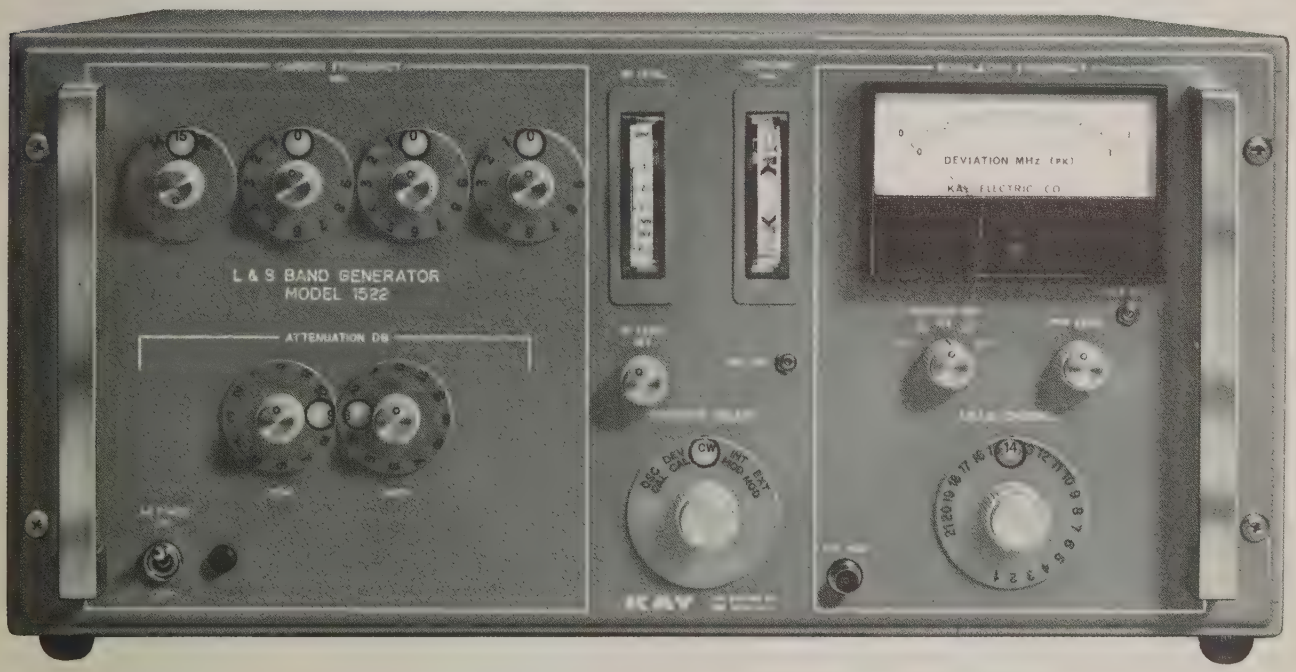
PRINTED IN U.S.A.

KAY NEW

TELEMETRY L AND S BAND FM SIGNAL GENERATOR

TENTATIVE DATA

JULY 1969



Model 1522 new FM signal Generator for the telemetry L and S bands uses phase-lock techniques to provide

- **SUPERIOR STABILITY AND ACCURACY**
- **DIGITAL CONTROL OF RF FREQUENCY**
- **SET UP FOR REMOTE OPERATION AND/ OR BCD PROGRAMMABILITY**
- **PROGRAMMABLE (REMOTE) OPERATION**

Carrier Frequency: Programmable within band by 3 decade (BCD) contact closures or logic levels
IRIG Channel: Programmable by contact closures, 21 lines
RF Attenuation: Fixed steps programmable by contact closure, 9 lines

KAY ELEMETRICS
FORMERLY KAY ELECTRIC

A new FM signal Generator for the telemetry L and S bands uses phase-lock techniques to provide superior stability and accuracy; and digital control of RF frequency, set up for remote operation or BCD programmability. Remote operation (or programmability) is also provided for RF output and IRIG channel selection.

The new generator, model 1522, is a solid state unit with peak FM deviations of up to ±3 MHz modulated on a self-contained, calibrated deviation meter. Internal modulation for each of the 21 standard IRIG subcarrier frequencies is provided. Calibrated RF output is adjustable from 0 dbm to —120 dbm.

RF FREQUENCY

Range: L Band — 1400.00 to 1599.9 MHz
S Band — 2200.00 to 2299.9 MHz
Settability: 100 KHz, digital control
Accuracy: ±.002%, calibrated after one half hour warm-up.
Stability: Drift plus incidental FM less than ±2 KHz pk for 1 minute, less than ±5.0 KHz pk for 10 minutes, less than ±15 KHz for one hour.
(Residual FM: <1.5 KHz on L Band; <2.0 KHz on S Band)

RF OUTPUT

Range: 0 dbm to —120 dbm
Attenuation: 0 to 119 db in 1 db steps plus continuously variable, metered 0 to 3 db
Calibration accuracy: Overall — ±1 db over band
Fixed steps — Below 2 GHz; ±(1% ±.3 db)
— Above 2 GHz; ±(2% ±.3 db)
Leveling: <1.5 db pk-pk across each band
Impedance: 50 ohms, Type N connector
Spurious: All in-band spurious signals more than 50 db below the calibrated output level
Harmonically related >20 db below calibrated output
Auxiliary: —10 db output, 50 ohms, Type N connector

MODULATION

Peak FM deviation: ±3 MHz (from <10 KHz)
Frequency response: ±1 db; DC to 750 KHz
±1.5 db; to 1.0 MHz
+2, —3 db; to 2.0 MHz
Frequency linearity: 1% of straight line for all deviations up to ±1.0 MHz at modulating frequencies from DC to at least 1.0 MHz

To straight line		Deviation		Modulating Frequency
L Band:				
<0.5%	@	±.5 MHz	and	.5 MHz
<1.0%	@	±1 MHz	and	1 MHz
<7.0%	@	±3 MHz	and	2 MHz
S Band:				
<.03%	@	±.5 MHz	and	.5 MHz
<0.7%	@	±1 MHz	and	1 MHz
<4.0%	@	±3 MHz	and	2 MHz

External FM input:
Impedance — 1000 ohms shunted by less than 45 pf
L Band Sensitivity — <1 volt rms for 1 MHz pk deviation
S Band Sensitivity — <.67 volts rms for 1 MHz pk deviation
Internal: IRIG channels 1-21
Frequency accuracy ±2%
Harmonic Distortion: <0.5%

Calibrated Deviation Monitor

Range: DC to 3 MHz in five ranges. Full scale 30 KHz, 100 KHz, 300 KHz, 1.0 MHz, and 3.0 MHz.
Accuracy: ±5% of full scale, for all modulating frequencies from 150 Hz to 1.5 MHz
Calibration: Internal calibrator using carrier null method

Programmable (remote) Operation

Carrier Frequency: Programmable within band by 3 decade (BCD) contact closures or logic levels
IRIG Channel: Programmable by contact closures, 21 lines
RF Attenuation: Fixed steps programmable by contact closure, 9 lines

Dimensions: 8¾" x 19" x 18" deep
Power: 115 volts AC or 230 volts AC ±10% 50/60 Hz, 60 watts

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ELEMETRICS CORP

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KAY 20Hz-4GHz

SOLID STATE SWEEP AND MARKER SYSTEM

TECHNICAL DATA

OCTOBER, 1968

Model 1500-C

- STABLE, NARROW SWEEPS
- FLAT, WIDE SWEEPS
- LOW COST MICROWAVE SWEEP
- PULSE AND BIRDIE MARKER SYSTEMS
- BUILT-IN ROTARY ATTENUATORS
- PLUG-IN RF DETECTOR
- WIDE SWEEP RATE RANGES
- ONE-SHOT SWEEP
- METERED RF OUTPUT

The all solid-state 1500-C sweep generator system features a new group of high-level microwave plug-ins to extend the frequency limits from 20 Hz to 4 GHz. The new devices offer stable, narrow sweeps as well as full octave-wide sweeps. The basic sweep and marker unit offers varied combinations of general purpose and special application sweep and marker units. It contains a variable sawtooth sweep generator, a fast-acting AGC, frequency-marker control and output circuits, RF output circuits with precision, a calibrated output meter, an accurate plug-in detector, and carefully regulated Power Supply.

VARIED SWEEP MODES

The wide choice of sweep repetition rates permits selection of optimum rates for each application. The sweep may be continuously varied from .01 to 100 Hz; going slowly enough through the passband to permit sweep alignment of high Q circuits; or it may be locked to the line frequency for general operation. Manual control of the RF frequency sweep and the synchronized deflection voltage sweep is provided to permit point-by-point control of the tracing of the frequency display. By the use of this technique, the most demanding circuits can be checked or recorded. VTVM and frequency measuring equipment can be added to permit swept frequency alignment and the gathering of many-digit numerical data from a single, easy to operate set-up.

A sawtooth signal, synchronized with the swept RF output, is available at a separate output terminal to drive the X-axis of an oscilloscope or recorder. No phasing adjustments are necessary. A blanking circuit is available to turn off the RF output during the retrace time to establish a zero reference line.

Up to 70 db of attenuation is provided by precision rotary attenuators. An additional 6 db of variable RF gain control provides continuous attenuation.

KAY ELECTRIC COMPANY
Maple Avenue • Pine Brook, New Jersey 07058

KAY

SWEEP PLUG-INS

MODEL	FREQUENCY RANGE	SWEEP WIDTH	PRICE
PC-141B	20Hz - 200KHz	0* - 20KHz	$505.00
PC-142B	35Hz - 600 KHz	0* - 20KHz	$505.00
PC-130F	0* - 2MHz	0* - 2MHz	$400.00
PC-152B	1KHz - 20MHz	10KHz - 20MHz	$400.00
PC-154C	50KHz - 110MHz	0* - 115MHz	$630.00
PC-855B	2 - 32MHz	0* - 800KHz	$630.00
PC-856B	10 - 120MHz	0* - 1MHz	$630.00
PC-860E	2MHz - 220MHz	10KHz - 30MHz	$475.00
PC-867B	220 - 470MHz	20KHz - 470MHz	$215.00
PC-123A	100MHz - 1GHz (Any Octave)	0.2% - Octave	$425.00
PC-120A	.75 - 1.5GHz	Nom. 0 - Full Octave	$1100.00
PC-125A	1 - 2GHz	Nom. 0 - Full Octave	$1150.00
PC-126A	1.2 - 2.4GHz	Nom. 0 - Full Octave	$1275.00
PC-128A	1.5 - 3.0GHz	Nom. 0 - Full Octave	$1490.00
PC-127A	2 - 4GHz	Nom. 0 - Full Octave	$1495.00

*Residual

PULSE MARKERS

The marker output circuits provide sharp, pulse type frequency pips, available at a separate output jack. The markers are variable in amplitude from 0 to approximately 10 volts peak and are fed independently to the vertical input of the oscilloscope. They are isolated from the circuit under test, cannot overload or effect the circuit in any way and are fully visible in traps and along the baseline. These pulse markers are sharp and clean and their width is a controlled fractional percentage of the total scope deflection. Marker width and shape are unaffected by changes in the frequency sweep. They provide the same excellent sharp pulse indicators on a narrow sweep as on a wide sweep. Most sweep generator heads supplied with the 1500-C provide for switching of the pulse markers to function as RF turn-off markers, appearing in the swept RF output of the sweep generator.

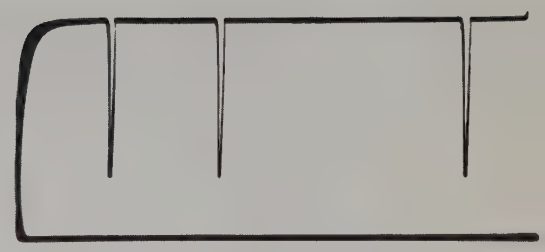
BIRDIE MARKERS

In addition to the pulse marker units, the 1500-C is also designed to provide single frequency, harmonic, and variable birdie markers. The birdie-pip markers are shaped, beat-note markers available at a separate output jack. They connect independently to the oscilloscope or recorder, bypass the circuit under test. As with the pulse markers, they will appear in traps and along the base line and cannot overload the circuits under test. They can be also used as internal markers to provide marker blips combined with the RF output.

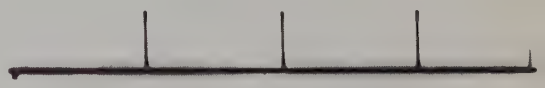
MARKER PLUG-INS

MODEL	FREQUENCY RANGE	FREQ. MARKER	PRICE
PCM-7631A	10KHz - 2MHz	6 Pulse + External	$160.00**
PCM-7632A	1KHz - 1MHz	6 Pulse + External	$160.00**
PCM-932B	2 - 220MHz	30 Pulse + External	$160.00**
PCM-861A	200KHz - 1GHz	Single Frequency & Harmonic Birdie	$160.00**
PCM-7670A	2.5 - 220MHz	Variable Birdie Plus 1 & 5MHz Harmonic Birdie	$295.00
	Pulse Type Markers	$17.00 each	
	CW Oscillator Markers	$35.00 each	
	Harmonic Markers	$45.00 each	

**Plus Markers



INTERNAL MARKERS



PULSE-TYPE MARKERS

SINGLE BIRDIE MARKERS

HARMONIC BIRDIE MARKERS

SPECIFICATIONS

PLUG-INS: 20 Hz to 1 GHz, Sweeps and Markers

SWEEP MODES: .01-100 Hz, Line Lock, Manual, External Modulation, One-Shot Sweep.

MARKERS: Pulse-type or single, multiple and variable birdie-pip type markers at customer specified frequencies. Marker amplitude continuously variable.

SWEEP DIRECTION: Hi-Lo; Lo-Hi

BLANKING: ON-OFF

SWEEP OUTPUT: Sawtooth, amplitude 7 volts, p/p, approximate

ATTENUATORS: 0-60 db in 10 db steps
0-10 db in 1 db steps
6 db, variable

DIMENSIONS: 19½" x 11" x 16¼"

WEIGHT: 52 lbs.

PRICE: $690.00

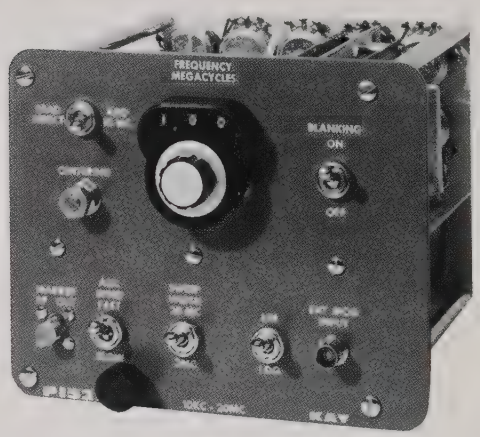
KAY

WIDE BAND VIDEO SWEEP GENERATOR

TECHNICAL DATA

OCTOBER, 1968

- WIDE VIDEO SWEEPS EXCELLENT WAVESHAPE
- FLAT RF OUTPUT
- SPECIAL EXT MOD FEATURE FOR "PERFECT" DISCRIMINATOR ALIGNMENT



The PC-152B is a solid-state, wide video sweep generator plug-in which may be used with Kay's 860H and 1500C systems to give 20MHz to less than 1 KHz in a single linear or logarithmic sweep. Additional features of continuously variable sweep widths and continuously variable center frequency provide excellent operation as a highly stable, narrow band sweep generator covering AM, IF and VIDEO frequencies in two switched bands. A multi-turn center frequency control provides exceptional fine touch setting of narrow sweeps and a direct reading, digital, frequency dial. Provisions for internal blanking markers are included when this plug-in is used with the Marka-Sweep 1500C.

The PC-152B is a solid-state, electronic beat frequency oscillator equipped with an output amplifier to provide a full 1.0 volt rms into load. The use of this additional broad band amplifier permits light coupling of the mixed oscillators, gives high output with superior wave shape and very low spurious. A two-speed AGC circuit provides flat output overall. Unlike other wide band devices of this type, no frequency shift is encountered even during large changes in output level. Careful shaping of the electronic modulating circuits provide for controlled, meaningful frequency linearity.

Performance characteristics include either linear or logarithmic sweeps and switchable sweep widths continuously variable to either 2 or 20 MHz. Any portion of the range can be swept in a centered sweep.

SPECIAL FEATURE FOR "PERFECT" DISCRIMINATOR ALIGNMENT

The fixed oscillator of this beat frequency sweep system can be frequency modulated at high rates by applying an external signal to a front panel jack. This technique provides a sine wave, whose output amplitude varies with changes in slope of the discriminator. The high-rate modulation is set to sweep only a small portion of the curve. The variable oscillator is then swept at a slow rate, providing an unchanging frequency deviation over the entire curve, maintaining "perfect" frequency linearity. The sine wave output of the discriminator provides an amplitude vs frequency display, that can be adjusted for exact linearity of the discriminator.

SPECIFICATIONS

FREQUENCY RANGE:	1KHz - 20MHz
SWEEP WIDTH:	Two Bands 1.0KHz- 20MHz 1.0KHz - 2MHz
OUTPUT:	1.0 V rms into 50 ohms, metered
FLATNESS:	±.25DB, 10KHz - 20MHz ± .5DB, 1KHz - 20MHz
HARMONIC AND SPURIOUS DISTORTION:	30DB down
RESIDUAL FM:	Wide 200Hz, PK Narrow 75Hz, PK
FREQUENCY STABILITY	(After 1 hr. warmup with constant line voltage and temperature) 300Hz/Min 2KHz/Hr. 100Hz/Min at Mid Band and higher frequencies.
SWEEP DISPLAY:	Linear or logarithmic
PRICE:	$400.00

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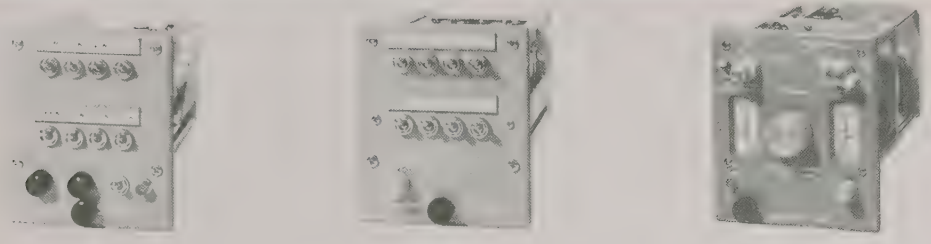
KAY NEW PORTABLE SIGNAL/MARKER GENERATOR



NEW MR76 PORTABLE GENERATOR

The MR76 is a small, compact, 300 KHz to 300 MHz signal generator with:

1.0 volt output, ALC'd flat over the entire frequency range,

0.2, 1.0, and 10 MHz crystal comb calibrators,

6 band calibrated frequency dial, and

Circuits to mix the generator and comb signals with sweeper outputs to form birdy-bypass markers.

A crystal sideband marker, 4.5 MHz from the generator, for .01% TV bandpass marking.

OR

The MR76 is a small, compact 1 to 100 MHz multi-frequency marker with:

Up to eight crystal markers.

Each marker individually switched.

Each frequency customer specified.

Pulse marker outputs that stay sharp on narrow sweeps.

OR

The MR76 is a small, compact 0.5 to 300 MHz multi-frequency marker with:

Up to 8 crystal, birdy-bypass markers.

Both single frequency and comb markers.

Each marker individually switched.

Each frequency customer selected.

WHEN

EQUIPPED WITH ONE OF THE KAY PM7670B, PM7650B, or PM7660B PLUG-INS.

The MR76 is a small, compact POWERED CARRYING CASE. It measures 6" x 8" x 12", plugs directly into the AC line, and accepts its marker plug-ins interchangeably with the KAY 154C and 159D sweep and marker generators.

With the PM7670 installed, it provides an excellent signal source (its flatness spec is ±.25 db overall). With any of the three plug-ins installed, it can be used with most sweep generators to provide basic (or additional) frequency marker systems.

MR76 Price: $100

Plug-In Prices:

PM7670B $295

PM7650 $150
Pulse Markers $35
Standard set includes markers at 2, 5, 10, 15, 20, 40, 60, 80MHz $295

PM7660 $150
Single birdy markers $45
Harmonic comb markers $55
Standard set includes harmonic combs of 1, 2, 5, 10, 20MHz $375

KAY ELEMETRICS CORP FORMERLY KAY ELECTRIC

Maple Avenue
Pine Brook, N. J. 07058
(201) 227-2000
TWX: 710-734-4347

Midwest Office
U.S. Route 31 North
South Bend, Ind. 46637
(219) 272-2848

West Cost Office
P.O. Box 206
Goleta, Calif. 93017
(805) 967-9316

FREQUENCY COUNTER-MARKER SYSTEM

- MARKS AND COUNTS WHILE SWEEPING
- MORE ACCURATE THAN XTAL-OSC OR OSC-COUNTER MARKERS
- ¼% READABILITY (SWEEP WIDTH) MEANS ¼% OF XTAL FILTER BANDPASS, XTAL DISCRIMINATORS, ETC.

MARKER SYSTEM

SHAPE: Triangular pulses.
AMPLITUDE: 0 to +10V peak.
DIRECTION: Vertical or horizontal, switchable.
VERTICAL MARKER WIDTH: Variable .5% to 2% of sweep width.
HORIZONTAL MARKER WIDTH: Variable.
REMOTE MARKER CONTROL: Voltage from −12V to +12V

SWEEP SYSTEM

SWEEP RATES: 100 seconds/sweep to 100 sweeps/second, switched-variable.
ADDITIONAL MODES: Push button one-shot sweep, manual sweep, start-stop sweep.
SWEEP VOLTAGE: 18V P/P triangular.
STOP/START SWEEP: End points settable to counter accuracy.
SWEEP DIRECTION: LO-HI; HI-LO.
TRACE-RETRACE RATIO: Variable 1:1 to 10:1.
AUX. BLANKING: 10V

COUNTER SYSTEM

FREQUENCY RANGES: DC ->10MHz; 1-115MHz.
ACCURACY: ±1 count ± time base stability.
GATE TIMES: 0.1ms, 1ms, .01sec, 0.1sec, 1sec.
INPUT SIGNAL:
SENSITIVITY: DC — 10 MHz range
DC — 5MHz — 100mv rms
5 — 10MHz — 200mv rms
1 — 115MHz range — 100mv rms
MAXIMUM INPUT LEVEL:
DC — 10MHz range — 50V rms operating
150V rms non-operating
1 — 115MHz range — 1V rms operating
5V rms non-damaging
IMPEDANCE: (Test signal out unloaded)
DC — 10MHz range: 1mΩ/<60pf
1 — 115MHz range: 1 - 75MHz - 500Ω
75 — 115MHz — 330Ω
TRIGGER LEVEL: Automatic.
TIME BASE:
CRYSTAL FREQUENCY: 1MHz
AGING RATE: <1ppm/mo (3 x 10^{-8}/day avg) after 30 days operation
STABILITY: <2 parts in 10^7/°C, 16°C — 32°C after 30 minutes operation.
<±.002% over 0-50°C range.
DISPLAY: 5 digits; display storage.
DISPLAY TIME (TYP):
1:1 SWEEP RATIO: 100 sec x 1 or 4 to a maximum of gate time x 2
10:1 SWEEP RATIO: 60 sec x 1 or 4 to a maximum of gate time x 2
Continuous for one-shot sweep
SAMPLE RATE (TYP):
1:1 SWEEP RATIO: 100 — .01 sec x 1 or 4
10:1 SWEEP RATIO: 60 — .006 sec x 1 or 4

VERTICAL PRE-AMPLIFIER

VOLTAGE GAIN: Adjustable from 3-32 db.
FREQUENCY RESPONSE: 3db DC gain-3db down at 25KHz, 4V P/P output. 32db DC gain — 3db down at 25 KHz, 1.8V P/P output.
MAXIMUM INPUT: ±5V
INPUT IMPEDANCE: 45KΩ/30pf.
DC REFERENCE: OFF, ZERO reference, and VAR amplitude reference during retrace.

HORIZONTAL OUTPUTS

VTO MODULATION SIGNAL: 0-18V P/P triangular wave for VCO sweeper modulation.
SCOPE SWEEP SIGNAL: 0-18V P/P plus horizontal marker modulation
SIZE: 17¼"W x 3½"H x 13"D.
WEIGHT: 14 lbs. $1,295.00

The Model 8323A is a DC to 115MHz frequency counter and frequency marker system. In this unit, a counter and a variable PULSE marker are combined in a completely new way to *mark and count* the frequencies of a VCO sweeper, *while it is sweeping*. The PULSE bypass markers provide settability and readability to better than ±0.25% of sweep width — no matter how narrow the width. The frequency counter provides counter accuracy of better than ±0.0002% and readout to the 7th significant digit.

Three independent markers are generated to mark and count any point in the sweeper range — and to set the ends of the sweep with the same accuracy. A versatile sweep drive (VCO control) generator is part of the counter-marker system. It provides sweep rates from 100 sec/sweep to 100Hz/sec, manual and start-stop sweep controls, zero blanking or variable reference lines during retrace, and a one-shot sweep. In addition to its system role, the frequency counter provides general purpose performance over the full DC to 115MHz range.

MARKER CHARACTERISTICS

The frequency markers are bypass markers, sharply triangular in shape, and can be individually switched to either horizontal or vertical directions. A sharp slope or flat top can be marked with the polarity most suited for easy visibility and highest accuracy. The size and width of the markers are independent of changes in sweep width and sweep rate. They connect directly to the oscilloscope or recorder input and are completely independent of test circuit variations. In addition to marker size, front panel controls permit individual adjustment of marker width. Circuits for mixing marker and scope input signals are arranged within the unit. A front panel control switches any of the three markers to a COUNTING function. Here, the selected marker is identified by a bright ball and its frequency is read out on the counter. Rear apron connectors are provided for independent remote operation, or analog programming, of the markers.

COUNTER CHARACTERISTICS

The frequency counter operates in two ranges: DC to 10MHz direct, and 1 to 115MHz using a built-in 10:1 divider. A 5 digit display reads in KHz or MHz, with automatically positioned decimal point. Resolution is in Hz on the DC to 10MHz range, 10Hz for the 1 to 115 MHz. Stored display is provided so that most recent measurement is indicated. In its marker counting function, this characteristic permits a choice of sampling rates. Either one count on each sweep or a count every fourth sweep can be selected by a front panel switch. The counter input is available at front panel connectors for independent use as a counter. A crystal oscillator provides the counter reference.

SWEEP DRIVE CHARACTERISTICS

The sweep drive circuits provide automatic, manual, start-stop, and one-shot sweep voltages. Sweep rates are variable from 100 sec/sweep to 100Hz/sec. The sweep voltage output is suitable for use with all Kay sweepers and with most other VCO sweepers of current design. Sweepers controlled by the 8323 sweep drive are automatically interfaced with the counter and marker circuits of the 8323 *and with their precise frequency markers*. In Manual operation, the counter continuously monitors the sweeper frequency as it is varied manually across the scope or recorder display. In Start-Stop, the counter monitors each end of the sweep as individual panel settings are made. Rear apron controls select either high-to-low or low-to-high sweep voltage direction and vary the symmetry of the "sawtooth" sweep voltage over a 10:1 range. A sychronized blanking signal output is available (in addition to the blanking function of the built-in scope pre-amp). For those applications where a single sweep through is desirable, the one-shot sweep can be employed over the full range of sweep times.

X-Y OUTPUT CHARACTERISTICS

Both X and Y outputs are composite signals available from single output connectors. Marker adder circuits are built in for both, and the Y axis output includes an audio pre-amplifier and a zero reference blanking circuit. The pre-amp provides up to 32db of variable gain. As a special feature, the zero reference line can be switched over to a variable reference mode. This provides an adjustable display line than can be set to calibrate and mark desired amplitude levels.

VARIABLE PULSE MARKER PLUG-INS

New, *low-cost* marker plug-ins feature twin variable PULSE markers that can be easily and quickly calibrated for the particular frequency range being swept. The accuracy, settability, and readability are far better than the performance of the usual "full-scale" variable markers.

The Model PM100 is designed for use in the KAY 154C, 50KHz-110MHz sweep generator. The PM300 is for use in the KAY 159D, 300KHz-300MHz sweeper. In addition to the two variable markers with direct-reading, digital frequency dials, each unit includes crystal comb markers at 1 and 10MHz intervals, marker mixing circuits, and range calibrate controls.

- XTAL CALIBRATED VARIABLE PULSE MARKERS
- 1.0MHz & 10MHz CRYSTAL COMB MARKERS
- NOVEL, QUICK-SET CALIBRATION
- LOW COST
- DIGITAL FREQUENCY DIALS
- SHARP PULSE FOR NARROW SWEEPS

VARIABLE MARKER CHARACTERISTICS

The variable markers are pulse type markers, independently variable in both frequency and height. They appear as zero-referenced pulses, adjustable upwards in height from the sweeper RF blanking line. Marking of the trace is accomplished by the sharp peak of the pulse without distorting, obscuring, or interrupting the test trace. The height of the marker can be set against the RF attenuator of the sweeper to indicate level points — 3db, 6db, etc. The variable markers are also available as conventional pulse markers superimposed on the trace, and as RF turn-off markers appearing as absorptions in the sweeper output. For down line operation, a separate output isolated from the RF permits calibration of the variable markers at the sending end.

The pulse markers are bypass markers which connect directly to the oscilloscope input and are completely independent of test circuit variations. They are available at a separate panel connector or mixed with the detector output of the sweeper. Internal switching selects positive or negative polarity (or one of each), where applicable. The narrow pulse markers remain narrow, sharp pulses at the narrow sweep widths and are readable to about ¼% of the sweep width. Each variable marker has its own digital dial tied to a multi-turn frequency control. Three fixed digits plus a vernier dial and a 10:1 scale magnifier offer dial readabilities to as low as 1KHz on the PM100, and 10KHz on the PM300.

CRYSTAL COMB MARKERS

Two crystal combs set up contrasting birdie-bypass markers at 1 and 10MHz intervals. Each comb is essentially flat over the full frequency range of the sweepers, and each has separate ON-OFF and LEVEL controls. The combs can be used separately or combined to give precise 1MHz marking with prominent marks at all 10MHz points. The center frequency of this easy-to-count display is given by 1% dials on the sweepers, and all markers can be quickly and easily identified. A single .005% crystal reference is used to maintain the same frequency tolerance at all marked points, and highly selective interface circuits provide stable, simultaneous, interference-free marking.

RANGE CALIBRATE CONTROLS

Since the frequency and dial tracking characteristics of the twin variable markers are identical, a single calibration can be made for both markers simultaneously and can be made quickly and easily. The displayed comb is used for checkpoints, and two end controls set the marker pulses exactly on their indicated frequencies. This Δf calibration, rather than the more common full-scale calibration, achieves far better accuracies than the usual 1 or 2% of full-scale or of dial reading. Typical accuracies for the PM100 and PM300 variable markers are 1% of calibration range. For example, at about mid-point on the PM100 (50MHz), calibration for a 10MHz range would give dial accuracies of about $\pm 0.2\%$. Calibration for a 2MHz range would yield accuracies of about $\pm 0.05\%$.

NARROW SWEEP MARKING

Generally, as sweep width narrows, required frequency tolerances tighten and the frequency readability of the sweeper-scope display increases. In the PM100 and PM300, both calibration accuracy improve and the frequency width of the pulse marker decreases. The dial scale magnifier provides a 10 to 1 increase in readability and settability for calibration ranges below 10MHz.

ADDED FEATURES

- The calibrated, variable markers can be used for accurate setting of frequency sweep; that is — as a stop-start control.
- The separate Comb and Pulse outputs can mark dual-channel scopes with pulse marks (only) intersecting the test trace.
- An oscillator connected to the external marker input of the sweeper can be calibrated against the comb and used as an added variable birdie-bypass marker.

PULSE MARKERS

FREQUENCY RANGE:
PM100: 0-100MHz for KAY 154C (or 159D) sweep generator.
PM300: 0-300MHz for KAY 159D (or 154C) sweep generator.

MARKER TYPES: Two individual, calibrated markers with continuously variable frequency and amplitude.

FREQUENCY CONTROLS: Direct-reading, multiturn with digital readouts and two display scales:
DIRECT: PM100 — full range 0-100 MHz. Three digits plus 20KHz per division vernier dial.
PM300 — full range 0-300MHz. Three digits plus 200KHz per division vernier dial.
MAGNIFIED: PM100 — full range 0-10MHz. Three digits plus 2KHz per division vernier dial, settable anywhere from 0-110MHz.
PM300 — full range 0-30MHz. Three digits plus 20KHz per division vernier dial, settable anywhere from 0-300MHz.

DIAL ACCURACY: Calibrated at .005%, 1MHz checkpoints. Typical accuracy ±1% of calibration range.

OUTPUT LEVEL: 0-5 volts peak, continuously variable. Individual level controls.

POLARITY: Positive or Negative, internally switched.

MARKER DISPLAYS: Trace, Baseline, or RF turn-off markers.

MARKER WIDTH: Less than 0.5% of sweep width.

MINIMUM SPACING: 2% of sweep width.

MAXIMUM REP RATE: 60Hz.

CRYSTAL COMB MARKERS

MARKER TYPES: Individual and combined 1 and 10MHz frequency combs.

FREQUENCY RANGE: 1 to 300MHz.

MARKER ACCURACY: .005% of frequency.

OUTPUT LEVEL: Individual level and on-off controls.
10MHz comb: approx. 0-2 volts P/P
1MHz comb: approx. 0-1 volt P/P

WEIGHT: approx. 3 lbs.

PRICE: $395.00

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Maple Avenue
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FORMERLY KAY ELECTRIC

Printed in U.S.A.

159D 300 KHz-300MHz

159D SWEEP GENERATOR

Full one volt RMS output. 300 MHz Wide Sweep Generator, covers its range in one sweep. Frequently equipped with PM7670 plug-in and harmonic markers at 10 MHz or 54MHz.

1024A AMPLIFIER

This wide band unit provides 30db of gain over the 200 Hz to 300 MHz range.

CATV Test Instruments

**All models available in 50 or 75Ω*

1024-A
1 KHz-300 MHz

792A1 AUTOMATIC NOISE FIGURE METER

Wide Band, automatic noise measurements may be made quickly and easily with the 792A1. Measurements in the 10 to 1000 MHz range are made using one noise source. TV channel input selector available — 792A2

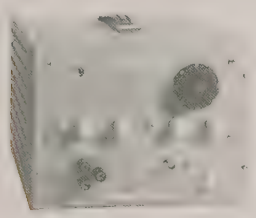
792-A1
10-1000 MHz

3092A SOUND and PICTURE MODULATOR

The 3092A single channel sound picture generator, may be used to test and align television receivers. It will also operate as a transmitter for closed circuit applications.

255B COAXIAL SWITCH

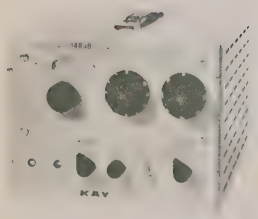
The 255B provides a high frequency DPDT switch, whose switching rate is determined by an internal generator or external sync signal. This provides "simultaneous" display of circuit characteristics for comparative measurements. DC-1000 MHz.



3092-A

1483B UHF SWEEP & MARKER GENERATOR

The 1483B covers the entire UHF band in a single sweep or continuously variable widths from 60 to 5 MHz. Channels 14 and 83 are provided at two separate switch positions.



1483-B
440-960 MHz

121C SWEEP GENERATOR

The 121C provides wide sweeps at UHF or VHF frequencies. Various plug-ins available to extend the coverage to 4 GHz.

ATTENUATORS

A complete line of attenuators is available for 50 or 75 ohm applications.

121-C
500 KHz-4 GHz

NEW! VARIABLE MARKER PLUG-INS

For use with 159-D Sweeper

PM 7670

PM7670

300 KHz — 300 MHz variable with 4.5 MHz crystal sideband marks, and 1 and 10 MHz harmonic combs.

PM 300

PM300

0 - 300 MHz variable dual pulse markers.

from KAY

Maple Ave., Pine Brook, New Jersey 07058 (201) 227-2000

Printed in U.S.A.

AUTOMATIC NOISE FIGURE METER

792A1

A new low-cost, automatic noise measuring set features for CATV a *75 ohm, 10 to 250MHz tuned amplifier input* and a *75 ohm, 10 to 1000MHz full range noise head.* The cost of this solid state unit is kept low by its emphasis on the below 1000MHz range. Facilities for higher frequency measurements are provided but at somewhat higher cost. Either 75 or 50 ohm input impedances can be specified.

TUNED INPUT AMPLIFIER

The center-tuned, wide range input is particularly useful for testing of broad amplifiers. It will measure the noise spectrum at mid-range for simplified, overall checks or can be used for noise measurements at specific bands (channels) all over the range. The tuned input amplifier is about 5 MHz wide at centers from 170 to 250MHz. Response at 270MHz is less than 3db down. It is continuously variable in twelve overlapping frequency bands, and is completely free of the spurious and image related errors introduced by frequency converter inputs. This maintains the ±0.5db accuracy of the noise meter — both, for plotting the noise curve of very wide amplifiers and for noise testing narrow-band amplifiers at any of the input frequencies.

BROAD NOISE OUTPUT

The broad-band, 75 ohm noise head covers its 10 to 1000MHz range with flat, 6db excess noise output at a VSWR of better than 1.2 to 1. It is used as automatic reference for a 0 to 20db noise figure meter scale with expanded readability in the 1 to 12db region. The unit can be ordered with either an "N" or "F" connector and may be used for manual measurements, as well as automatic. Since noise output is generated by a resistive element heated to 2200°K, accuracy is essentially unaffected by temperature changes in the environment. It is held to ±0.2db below 250MHz, ±0.3db below 1000MHz. The noise source operates from low voltage, low current inputs and is housed in a small, compact unit at the end of a flexible cable. It can be operated close up to the input of the test amplifier. Provision is made for the later addition of other solid-state and gas tube noise sources extending into the high microwave frequencies. In this way, an expanded applications requirement can be met without the full expense or added space demands of an additional unit.

AUTOMATIC NOISE SYSTEM

A direct-reading panel meter provides noise figure readings over a range of 0 to 20db for the 6db automatic reference; 3 to 30db for gas tube and solid state sources. Infinity is marked. The system input covers a wide zero to minus 70dbm range (nominal 5MHz bandwidth), takes about 35db of gain after the 6db noise generator. It includes a built-in attenuator with 41db in 1db steps and a highly effective, 40db AGC. An input level meter indicates proper gain and AGC control. To accommodate long term variations in system gain, a self-calibrating feature is included. Additional features include a variable IF gain for MANUAL measurements, external meter connections, and meter offset adjustments for increased readability at very low noise figures.

PRESET TV CHANNEL SELECTION

As an alternate, no-cost option, the input IF can be ordered preset to TV channel frequencies.

NOISE METER

INPUT FREQUENCY: 10 to 250MHz, center. Continuously variable in 12 overlapping bands. <3db down at 270MHz.

INPUT IMPEDANCE: 75 or 50 ohms, type N or F connector.

INPUT BANDWIDTH: Nom. 5MHz centered from 10 to 170MHz, Nom. 10MHz from 170 to 250MHz.

INPUT RANGE & SENSITIVITY: 0 to —70dbm (nom. 5MHz band), 35db of gain after 6db source.

INPUT ATTENUATOR: 0 to 41db in 1db steps.

INPUT AGC: 40db.

NOISE FIGURE RANGE: 0 to 20db for 6db reference. 3 to 30db for gas tube and solid state sources.

POWER REQUIREMENTS: 117V ±10%, 50/60Hz.

WEIGHT: 22 lbs.

DIMENSIONS: 19" x 7" x 13½".

PRICE: $840.00.

NOISE REFERENCE/GENERATOR 7921A1

FREQUENCY RANGE: 10 to 1000 MHz.

INPUT IMPEDANCE: 75 or 50 ohms, type N or F connector.

EXCESS NOISE OUTPUT: 6db.

ACCURACY: ±0.2db, 10 to 250MHz; ±0.25db, 250 to 500MHz; ±0.3db, 500 to 1000MHz.

VSWR: Better than 1.2 to 1.

WEIGHT: 1½ lbs.

DIMENSIONS: 5" x 3⅛" x 2".

PRICE: $150.00.

MICROWAVE NOISE REFERENCES

Solid-state and gas tube sources additional — Pulsing power supply required for gas tubes.

OPTIONAL PRESET TV CHANNEL INPUT

Input selector switches TV channels instead of 10 to 250MHz range above.

ARGON WAVEGUIDE SOURCES

MODEL NO.	FREQUENCY RANGE (GHz)	NF RANGE (db)	VSWR	EXCESS NOISE OUTPUT (db)	ACCURACY	PRICE
NM781	.4-4	3-30	1.3:1	15.2	±0.5db	$345.00
261A	2.6-3.95	3-30	1.1:1	15.45	±0.5db	185.00
271A	3.95-5.85	3-30	1.1:1	15.45	±0.5db	185.00
281A	5.85-8.2	3-30	1.1:1	15.45	±0.5db	185.00
291A	7.05-10	3-30	1.1:1	15.45	±0.5db	185.00
301A	8.2-12.4	3-30	1.1:1	15.45	±0.5db	185.00
521A	12.4-18	3-30	1.1:1	15.45	±0.5db	265.00
531A	18-26.5	3-30	1.1:1	15.45	±0.5db	265.00

ABOVE SOURCES REQUIRE PULSING POWER SUPPLY — $160.00

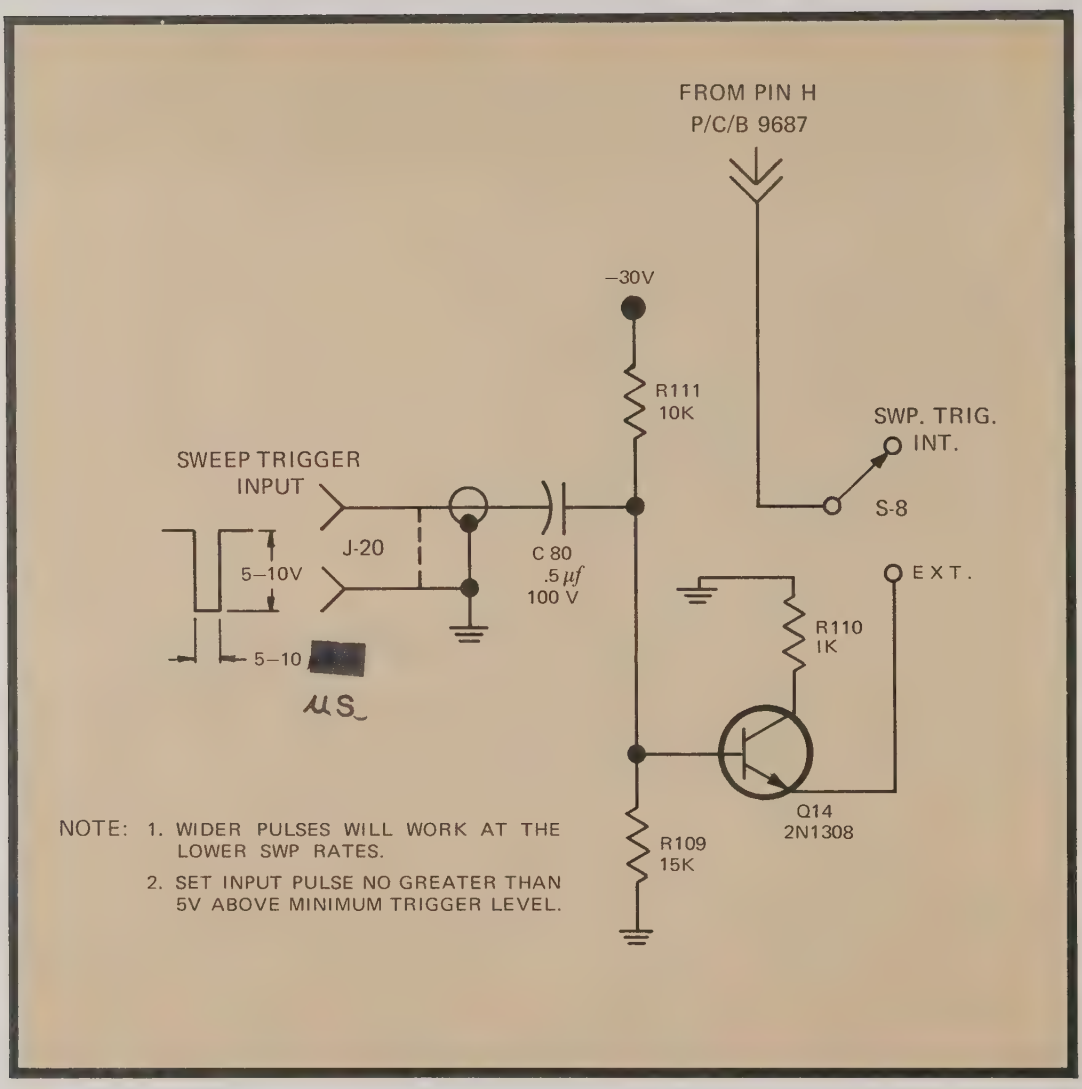
the KAY

159D now offers:

- ONE VOLT RMS OUTPUT INTO 50 OR 75Ω FOR THE SAME LOW PRICE
- A WIDER FREQUENCY COVERAGE 300KHz-300MHz FOR THE SAME LOW PRICE
- A NEW VARIABLE BIRDIE MARKER PLUG-IN INCLUDES: .2,1, AND 10 MHz HARMONIC COMBS PLUS A 4.5 MHz CRYSTAL SIDEBAND MARKER – FOR A LOW $295 - PM7670
- A NEW FULL RANGE, CALIBRATED PULSE MARKER PLUG INCLUDES: TWO CALIBRATED VARIABLE PULSES +1 AND 10MHz CRYSTAL HARMONIC COMBS – $395 - PM300
- A NEW EXTERNAL SWEEP TRIGGERING INPUT THAT LETS YOU SWEEP WHEN YOU WANT TO SWEEP. CHECK YOUR SYSTEM WITHOUT SHUTTING DOWN. $25
  (See Reverse Side)

FOR COMPLETE SPECIFICATIONS
SEE PAGES 14 AND 15 OF THE RF TEST INSTRUMENT CATALOG

KAY ELEMETRICS Formerly KAY ELECTRI
Maple Avenue • Pine Brook, New Jersey 07058



KAY ELEMETRICS

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PRINTED IN U.S.A

KAY NEW

PLUG-IN MARKER SYSTEM

PM 7670B

The Model PM7670/PCM7670 is an all new, wide range, fundamental output, variable marker system. This small, compact plug-in provides direct reading variable markers over a wide .3 to 300 MHz frequency range. The markers can be added to the swept response at the oscilloscope or recorder, thus by-passing the circuit under test. As with pulse-type markers, they will appear in traps and along the baseline and cannot overload the circuit under test. They can also be used as internal markers to provide marker blips combined with the RF output.

In addition to the variable marker system, the unit offers harmonic birdie markers at 0.2, 1, and 10 MHz. Each of these markers can be easily switched in to present multiples of the frequency along the response and provide precise calibration points when used in conjunction with the variable marker. Crystal controlled 4.5 MHz side band markers may also be selected for convenient marking of TV channel band widths.

A CW output is also provided on the PM7670. The 1 volt RMS, .3 - 300 MHz signal is available at a convenient front panel terminal for use as an additional RF generator. The output frequency of the variable marker as well as the CW signal are directly readable via the accurate, hand calibrated dial. The marker output may be monitored by connecting the CW output to a suitable frequency counter.

SPECIFICATIONS

FREQUENCY RANGE: .3 to 300 MHz in 6 Bands
FREQUENCY BANDS: 0.3 - 1.0 MHz
1.0 - 3.0 MHz
3.0 - 10.0 MHz
10.0 - 30.0 MHz
30.0 - 100.0 MHz
100.0 - 300.0 MHz
CRYSTAL CALIBRATING MARKERS: .200 MHz Harmonic Birdies
1.0 MHz Harmonic Birdies
10.0 MHz Harmonic Birdies
4.5 MHz Side Band Birdie
RF OUTPUT: 0.3 - 300 MHz
CW OUTPUT: 1.0 volt RMS $\pm$0.25 db into 50 Ω
MARKER RF OUTPUT: 20 MV RMS into 50 Ω
FREQUENCY DIAL ACCURACY:
VARIABLE MARKER: 1% over entire frequency band when calibrated at midrange
0.5% over 10% band width around calibration point (calibration points at every 0.2, 1.0, and 10 MHz).
CALIBRATE MARKS: 0.01%
DRIFT: .01% per hour under normal temperature conditions after $\frac{1}{2}$ hour warm up.
VARIABLE MARKER DISTORTION:
FUNDAMENTAL OUTPUT: None
HARMONICS (MAXIMUM): Second, 30 db
Third, 36 db
For Model 1500C specify PCM7670
For Models 154 and 159 specify PM7670

PRICE: $295.00

KAY
Maple Avenue
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P.O. Box 206
Goleta, Calif. 93017
(805) 967-9316

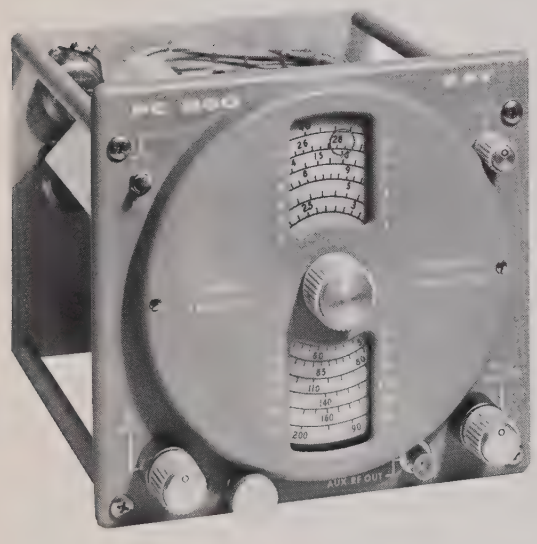
PRINTED IN U.S.A.

KAY **NEW**

FUNDAMENTAL FREQUENCY VARACTOR TUNED SWEEP PLUG-IN

TENTATIVE DATA

MAY, 1969



- ULTRA-STABLE NARROW SWEEPS (0-2.5%)
- GENERAL-PURPOSE WIDE SWEEPS (0-25%)
- SOLID STATE
- LOW RESIDUAL
- NO SPURIOUS

The new, PC-860E, 2-220 MHz sweep generator plug-in achieves the operating performance of three earlier plug-ins by a unique adaptation of inductive tuning. It is:

1. A sweep and CW generator plug-in head designed to meet the rigorous requirements of narrow-band, steep skirt filter applications.

2. A general purpose sweep generator plug-in designed to provide high-level, fundamental frequency, flat, linear, sweeps which have excellent wave shape and are completely free of spurious products.

TWELVE FUNDAMENTAL BANDS

The PC-860E covers its frequency range in 12 overlapping, direct reading frequency bands. Two sweep width ranges are switched by a panel control. (A vernier fine tune control for narrow sweeps and an auxiliary output for use with frequency markers or frequency counters are also provided on the front panel.) The restricted range of each individual band makes for a superior, fine touch tuning of center frequency, unusual in a unit of such wide overall capabilities.

A companion unit, the PC-857, provides the same characteristics over a frequency range of 1 to 175 MHz.

Both plug-ins are designed to operate in either the Kay 1500C sweep and marker plug-in unit or in the 860H sweep plug-in rack.

KAY ELECTRIC COMPANY
Maple Avenue • Pine Brook, New Jersey 07058

FREQUENCY RANGE: 2 to 220 MHz for the PC-860 plug-in
1 to 175 MHz for the PC-857 plug-in

RF OUTPUT: 1 volt rms into 50 ohms, 1 db vernier attenuation

SWEEP WIDTH: 2 positions — Wide and Narrow, 10:1 ratio

Continuously variable to maximums of . . .
25% from 1 to 220 MHz (% of center
30% from 1 to 175 MHz frequency)
40% from 1.5 to 132 MHz

RESIDUAL FM AT MHz	NARROW SWEEP	WIDE SWEEP
1	3 Hz (pk)	9 Hz (pk)
2	3	10
10	10	50
15	12	65
30	25	150
75	50	325
100	100	500
150	175	750

FREQUENCY STABILITY: Plus/minus .002% per min. (constant temp.)
Plus/minus .008% per degree C

FREQUENCY BANDS:

	PC-857	PC-860		PC-857	PC-860
1	1.0- 1.5	2- 3	7	20- 32.0	38-58
2	1.5- 2.3	3- 5	8	32- 48.0	58-81
3	2.3- 4.0	5- 8	9	48- 65	81-110
4	4.0- 6.8	8-14	10	65- 88	110-145
5	6.8-12.0	14-24	11	88-132	145-180
6	12.0-20.0	24-38	12	132-175	180-220

PRICE: $595

KAY ELECTRIC COMPANY

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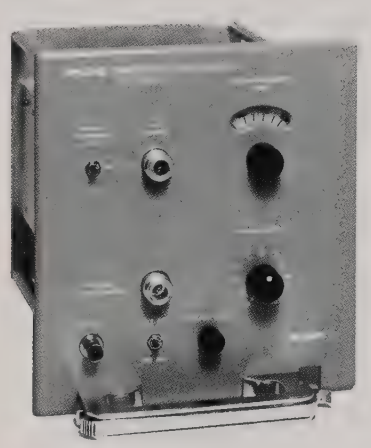
KAY NEW

MICROWAVE SWEEP PLUG-INS TO 4GHz

TECHNICAL DATA **OCTOBER, 1968**



Model P-126

- OCTAVE WIDE SWEEPS
- HIGH POWER OUTPUTS
- "QUALITY" NOT "LUXURY" PRICES

MICROWAVE OUTPUTS TO 4 GHz

A recently designed group of plug-in, microwave sweep generators are now available for use in the 121-C, 1500-C, and 860-H sweep systems. Extending the frequency range to 4 GHz, they offer stable, narrow sweeps as well as full octave, wide sweeps. The basic rack units provide all necessary power and sweep signals. Controls mounted directly on the plug-in insure simple, accurate setting of frequency output.

STABLE, HIGH POWER OUTPUT

The use of completely solid-state circuitry enables the plug-in to provide high output power, low spurious signals and excellent frequency accuracy and linearity.

NEW, MORE FLEXIBLE SWEEP SYSTEM

When combined with the Kay line of low frequency plug-ins, these new sweep generators comprise a more versatile system. It is no longer necessary to have on hand a number of different sweepers; one basic rack may be selected and "custom tailored" thru the selection of desired plug-ins.

UNIQUE CONSTRUCTION

These are characteristically high quality, high performance instruments at "quality" rather than "luxury" prices. Panel control frills, such as separate sweep end adjustments, deriving from the "rubbery" feel of the older BWO type settings, are avoided. The same simple and inexpensive control circuits used in Audio and UHF sweep generators furnish easy control of the oscillator output.

SPECIFICATIONS

PLUG-IN	FREQUENCY RANGE	POWER OUTPUT*	
		*Minimum into 50Ω	
		Leveled	Unleveled
P-120	.75 - 1.5 GHz	10 mw	13 mw
P-125	1 - 2 GHz	10 mw	13 mw
P-126	1.2 - 2.4 GHz	50 mw	70 mw
P-128	1.5 - 3 GHz	15 mw	18 mw
P-127	2 - 4 GHz	10 mw	13 mw

SPURIOUS: 20 db below full output (Harmonic)
SWEEP WIDTH: 0 - Full Octave, variable
FREQUENCY LINEARITY: 1.1:1
FEATURES:
Direct Reading Center Frequency Dial
Continuously Variable Output Level
Internal ALC
Provision For External ALC
External ALC Level Control
Basic Rack Provides Sweep Control

PRICE:
P-120 — $1100
P-125 — $1150
P-126 — $1275
P-127 — $1495
P-128 — $1490

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PLUG-IN RF MODULES		K10237		K10324	K10325-6	K10327-8
MODULE	**FREE RUNNING**	**STABILIZED**	**STABILIZED**	**STABILIZED**	**STABILIZED**	**STABILIZED**
FREQUENCY RANGES VARIABLE:	.05-110MHz	1-10MHz	10-70MHz	0.1-1.0MHz	1.0-5.0MHz 5.0-10.0MHz	10-30MHz 30-70MHz
RESIDUAL FM LINE RELATED: RANDOM:	 500Hz pk 100Hz pk	 100Hz pk 50Hz pk	 400Hz pk 100Hz pk	 5Hz pk 5Hz pk	 5Hz pk 5Hz pk	 20Hz pk 20Hz pk
SWEEP WIDTH RANGES VARIABLE:	0-100MHz					
AM SPURIOUS HARMONIC: NON-HARMONIC:	 below—30 db below—30 db					
SWEEP LINEARITY 100 MHz SWEEP: (WIDE) 0-4% SWEEP: (MEDIUM) 0-1% SWEEP: (NARROW)	 ±5% (of sweep width)					
STABILIZED OUTPUT FREQUENCIES — **FREQUENCY SETTABILITY** FIXED STEPS: VERNIER:	 10KHz 20Hz	 100KHz 200Hz		 1KHz 2Hz	 10KHz 20Hz	 100KHz 200Hz
FREQUENCY CALIBRATION FIXED STEPS: FIXED plus vernier:	 ± .002% Accuracy (% of indicated frequency) ± .01% Accuracy (% of indicated frequency)					
FREQUENCY DRIFT ONE MINUTE ONE HOUR 10 VOLT LINE VAR. PER °CENTIGRADE	 ± 5ppm on 0—1% Sweep Range, ±20ppm on 0—4%. ±20ppm on 0—1% Sweep Range; ±80ppm on 0—4%. ±10ppm on 0—1% Sweep Range; ±20ppm on 0—4%. ±30ppm on 0—1% Sweep Range; ±120ppm on 0—4%.					**(AFTER 10 MINUTE WARMUP)**

- 50 KHz to 110 MHz
- 100 KHz to 70 MHz Stabilized Narrow Sweep and CW
- Wide Sweep
- Markers

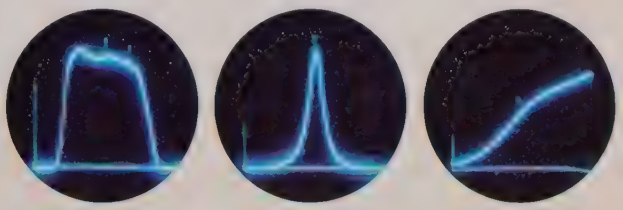
Sweep-synthesizer performance at far from "synthesizer" cost.

BOOTH 2D25-2D31 AT IEEE.

The Syntha Sweep 101-A offers not only 100 MHz wide sweeps, versatile pulse and birdie marker plug-ins, and sophisticated sweep and manual frequency controls; but also superb, low residual and narrow-sweep capability. It brings a new order of swept and CW stability, of narrow band frequency marking, of calibrated CW output frequencies, and of programmable swept and CW operation through the use of newly developed IC synthesizer circuitry.

NEW
MODEL 101-A

Solid-state wide sweeps now locked for STABLE narrow sweeps and CW ■ direct reading digital frequency dial now .01% accurate for CW and narrow sweeps ■ voltage-controlled sweeps now precision controlled for computer control ■ Horizontal and vertical pulse markers spaced only cycles apart.



THE SWEEP SYNTHESIZER

Phase-locked frequency synthesizer — wide-sweep and marker generator — precisely-calibrated cw signal source — low residual, narrow-sweep and narrow-marker generator — ultra-stable sweep generator — programmable cw generator — programmable sweep generator.

The 101-A begins by offering not only the 100MHz wide sweep, versatile pulse and birdie marker plug-ins, and sophisticated sweep and manual controls associated with the Kay 154C, but also the superb, low residual and narrow-sweep capability associated with the Kay P855 and P856-A. To these it adds a new order of swept and cw stability, of narrow-band frequency marking, of calibrated (0.01%) cw output frequencies, and of digital/analog programmability through the use of newly developed IC synthesizer circuitry. The price at around $3000 for a unit that includes a "locked" range of 100KHz to 70 MHz is a fraction of the cost of the usual synthesizers.

CW & Swept-Frequency

Front panel controls select stabilized (±5ppm/min; 20ppm/hr) cw operation, stabilized narrow-sweep operation variable up to 4% of center frequency, or free-running wide sweep operation variable up to 100 MHz of sweep between the limits of 50 KHz and 110 MHz. The stabilized frequency output is controlled by a direct-reading 3 place digital switch arrangement (calibrated to ±0.002%) and a digital-reading, vernier dial calibrated for overall accuracy of ±0.01%. Center frequency is remotely programmable via a rear apron connector which requires BCD input for each of the three significant digits and an analog voltage for the vernier. Sweep width is programmable via the External Modulation Input of the sweep generator.

Applications

The sweep synthesizer answers the need for wide sweep and marker capability coming from the current facility for designing broad-band circuits and devices. At the same time, it provides the narrow-sweep and cw (or Manual Mode) characteristics called for by recent progress in designing and producing pin-point frequency discriminating circuits. Steep-slope, narrow-band filters can be repetitively and precisely swept and frequency marked. In addition, pure, phase-locked cw signals (or sweeps) provide the continuous stability required for long-duration tests as well.

Plug-in Modules

The full 50 KHz to 110 MHz range (includes stabilized 1 MHz to 70 MHz) is covered by the K10237 module, a VCO constructed as a plug-in assembly fitted in place from the rear of the instrument. In addition, a set of limited range modules cover 0.1 to 1.0 MHz, 1.0 to 5.0 MHz, 5.0 to 10.0 MHz, 10 to 30 MHz, and 30 to 70 MHz, respectively. These provide typical spurious FM as low as 5 to 10 Hz peak (as compared with a 150 Hz residual of the wide-range module). Special purpose, narrow-band modules can be supplied on order to provide still lower residuals. All plug-in oscillators are operated by the front-panel controls and maintain the same frequency stability.

THE FREQUENCY SYNTHESIZER

The phase-locked frequency synthesizer operates between 100 KHz and 70 MHz in fixed steps of 1.0 KHz, 10 KHz, or 100 KHz depending on the frequency range. A direct-reading, linear vernier provides continuous frequency coverage between steps with a resolution of cycles and a direct-reading, precise frequency calibration. A judicious use of both BFO and fundamental frequency oscillators provides excellent waveshapes and low spurious. Variations due to line voltage or temperature changes are minimal, warm-up time is very short, and the rapid switching time for external programming equips the unit for automatic testing installations.

Counter Output

For applications where the use of an external frequency counter may be desired, a special tap-down circuit permits the use of relatively low cost 10 MHz counters to provide accurate frequency readings over the full 70 MHz.

THE SWEEP GENERATOR

The sweep generator incorporates the phase-locked frequency synthesizer, and offers its characteristics in its locked mode of operation. In addition, it provides highly developed solid state, electronic sweep and marker performance covering from video frequencies to beyond the FM radio band. It covers its spectrums in a single sweep and offers the additional features of continuously variable sweep width and continuously variable center frequency.

PM-10 — calibrated, variable, pulse markers

PM 7650 — pulse markers
PM 7660 — birdie markers

Operating Modes

Performance characteristics include line lock, variable, CW, manual and external repetition rates. A sawtooth sweep is generated, is separately available, and requires no phasing adjustments.

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A front panel control provides for manual tracing of the frequency response display. It operates over the same range as the electronically swept mode of operation and permits tracing of the frequency response with point-by-point control. It may be used with the VTVM or frequency counter without changing the swept alignment set up.

A rear panel control permits inversion of the sawtooth waveshape. In this manner, frequency sweeps from low to high or from high to low frequencies may be produced, as required. Provision for operation from external ALC detectors, (as in impedance plotter applications), is a standard feature.

THE MARKER SYSTEM*

Provision for a variable birdie-pip marker derived from an external oscillator is included on the sweep generator. A separate marker pip output is available for direct connection to the oscilloscope, by-passing the circuits under test. In addition, the PM-7650 and PM-7660 marker plug-ins offer birdie-pip and pulse markers to 110MHz. Plug-in marker heads may be simply changed or added as required.

The PM-7650 offers up to eight, optional, individually switched crystal pulse markers at customer specified frequencies between 1 and 110 MHz. These pulse markers are sharp and adjustable in height. Their width is a fixed fractional percentage of the total scope or recorder horizontal deflection and does not change with changes in sweep width. They remain narrow markers even on very narrow sweeps.

The pulse type markers are available from a separate output jack and can be fed directly to the Y axis or Z, (blanking marker), axis of a scope or graph. In addition, the pulse markers may be used as RF turn-off markers providing sharp absorptions in the RF output. Standard set of markers 2-5-10-15-20-40-60-80 MHz is offered.

Single Frequency And Harmonic Marker Plug-In

The PM-7660 offers individually switched, single frequency and/or harmonic birdie-pip markers between 0.5 and 110 MHz. Up to eight individual crystal oscillator markers can be ordered at customer specifed frequencies. Up to seven harmonic markers can be ordered at a specified frequency and its harmonics. Single frequency and harmonic frequency markers can be combined in the same plug-in modules, and can be replaced or added as required.

The birdie-pip markers are shaped, beat-note markers available at a separate output jack. They connect independently to the oscilloscope or recorder, bypass the circuit under test. As with the pulse markers, they will appear in traps and along the base line and cannot overload the circuits under test. They can be also used as internal markers to provide markers to provide marker blips combined with the RF output.

*PM-10 Narrow Band Calibrated Pulse Marker Plug-In

The use of IC's in an all-solid state design has made it possible to develop a complex frequency marking system consisting of:

(1) A direct reading variable pulse marker — only cycles wide and accurate to ±.05%.

(2) A slave pulse marker that can be accurately and simultaneously set only cycles away.

(3) A mixer-amplifier providing all marker coupling and 30 db of pre-amplifier gain.

in a small, compact, plug-in.

Designed to operate in the 101-A sweep generator, the PM-10 covers a frequency range from 100 KHz to 70 MHz, providing pulse markers whose width is approximately ½% of total sweep display over a wide range of sweep widths and sweep rates. It is narrow enough to mark filters that are only cycles wide. A calibrated three digit, ten turn dial provides readability of a cycle from 100 KHz to 1.0 MHz of 10 cycles from 1.0 MHz to 10 MHz, and of 100 cycles from 10 MHz to 70 MHz. Accuracy increases linearly on each of these ranges from the ±.05% spec to ±.005% at the high frequency end. Incremental dial accuracy (and the accuracy of the spacing between markers) is better than 2%. The 30 db mixer-amplifier provides a high input impedance of 100,000 ohms, variable gain, and an output of 4 volts peak to peak at 500 ohms.

Each of the two markers can be individually switched to present either a horizontal or a vertical pulse marker. The maximum range of the marker dial covers 1.5 KHz on the 100 KHz to 1.0 MHz range, 15 KHz on the 1.0 MHz to 10 MHz range, and 150 KHz on the 10 MHz to 70 MHz range.

PLUG-IN RF MODULES	K10237			K10324	K10325-6	K10327-8
MODULE	**FREE RUNNING**	**STABILIZED**	**STABILIZED**	**STABILIZED**	**STABILIZED**	**STABILIZED**
FREQUENCY RANGES VARIABLE:	.05-110MHz	1-10MHz	10-70MHz	0.1-1.0MHz	1.0-5.0MHz 5.0-10.0MHz	10-30MHz 30-70MHz
RESIDUAL FM						
LINE RELATED:	500Hz pk	100Hz pk	400Hz pk	5Hz pk	5Hz pk	20Hz pk
RANDOM:	100Hz pk	50Hz pk	100Hz pk	5Hz pk	5Hz pk	20Hz pk
SWEEP WIDTH RANGES VARIABLE:	0-100MHz	In 2 Ranges;		0 to 1% of Center Frequency 0 to 4% of Center Frequency		
AM SPURIOUS						
HARMONIC:		below — 30 db			below — 40 db	
NON-HARMONIC:		below — 30 db			below — 50 db	
SWEEP LINEARITY						
100 MHz SWEEP: (WIDE)	±5%	±.5% (of sweep width) ±100Hz				
0-4% SWEEP: (MEDIUM)	(of sweep	±.5% ±100Hz from 0—.5%, ±2% from 0.5 to 1%				
0-1% SWEEP: (NARROW)	width)					
STABILIZED OUTPUT FREQUENCIES						
FREQUENCY SETTABILITY						
FIXED STEPS:		10KHz	100KHz	1KHz	10KHz	100KHz
VERNIER:		20Hz	200Hz	2Hz	20Hz	200Hz
FREQUENCY CALIBRATION						
FIXED STEPS:		±.002% Accuracy (% of indicated frequency)				
FIXED plus vernier:		±.01% Accuracy (% of indicated frequency)				
FREQUENCY DRIFT						
ONE MINUTE		± 5ppm on 0—1% Sweep Range, ±20ppm on 0—4%.				**(AFTER 10 MINUTE WARMUP)**
ONE HOUR		±20ppm on 0—1% Sweep Range; ±80ppm on 0—4%.				
10 VOLT LINE VAR.		±10ppm on 0—1% Sweep Range; ±20ppm on 0—4%.				
PER °CENTIGRADE		±30ppm on 0—1% Sweep Range; ±120ppm on 0—4%.				

RF OUTPUT

RF Output: 1.0V RMS into 50 ohms, metered

Flatness: ±.25 db over full range

Attenuator: Switched 30, 30, 20, 10, 6, 3, 2, 1, 0.5 db plus 3 db Var. No shift in center frequency.

RF-Blanking: Off 80 db below 25 MHz: Off 80 db less 6 db per octave above 25 MHz.

ALC: Internal ALC plus connection for external ALC DETECTOR.

RF Detector: 50KHz - 110MHz

SWEEP VOLTAGE OUTPUT

Sweep Modes: .01 to 100Hz in 4 ranges, plus line lock.
Manual Control
CW Operation
External Modulation

Horizontal Output: 10 Volts, p-p, Triangular waveshape with Trace/Retrace ratio selectable 1:1 or 9:1.

Sweep Direction: Switched Hi-Lo, Lo-Hi.

FREQUENCY MARKERS:

Choice of marker plug-ins provide:

Up to 8 CW or 7 harmonic markers per PM7650.

Up to 8 fixed pulse type markers per PM7660.

One direct reading, calibrated variable pulse marker and one "follower" variable pulse marker per PM-10 plug-in for sweeps of 10KHz or less.

Up to 8 fixed, "percentage" pulse type markers per PM-11 for narrow sweeps.

PROGRAMMING:

BCD inputs for each of 3 switched decades plus analog for vernier.

Switching Time: 26Ms above 1MHz
260Ms below 1MHz

PRICES:

standard and special RF Module plug-ins.
K10237 Module —
K10324 Module —
K10325 Module —
K10326 Module —
K10327 Module —
K10328 Module —

MARKER PLUG-INS

PM-10

PM7650

PM7660

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MAPLE AVENUE, PINE BROOK, NEW JERSEY 07058 • 201 / 227-2000

KAY

NEW

FUNDAMENTAL FREQUENCY WIDE SWEEP GENERATOR

TECHNICAL DATA **OCTOBER, 1968**

Model 1484-A

- FUNDAMENTAL FREQUENCY
- NO SPURIOUS
- NO BEATS

NEW FUNDAMENTAL FREQUENCY OSCILLATOR

A new VHF fundamental frequency, wide sweep generator is now available as a plug-in module for use in the 1484-A. The module provides a swept output in a single sweep with NO spurious and NO beats generated. Harmonic distortion is more than 30 db down and the 1.0 V rms output is flatter than ±.25 db overall. The sweep width is continuously variable from 0 to the 190 MHz range of the module.

Provision has been made for either six single or five harmonic birdie markers at customer selected frequencies. The front panel band selector allows easy selection of the desired portions of the sweep. RF output level is controlled by two optional attenuators and a 5 db variable RF level control.

SPECIFICATIONS

FREQUENCY RANGE: 40 - 230 MHz
SWEEP WIDTH: 0* to 190 MHz
RF OUTPUT: 1.0 V rms into 50 ohms or 75 ohms
FREQUENCY LINEARITY: 1.1:1
SWEEP RATE: 5 to 60 Hz, locks to line
HORIZONTAL SWEEP VOLTAGE: (+) or (–) 4 volts, regular sawtooth
FLATNESS: ±.25 db overall
DISTORTION: 30 db down
*Residual

CALIBRATED CENTER FREQ. DIAL: 10 MHz Increments
CONTINUOUSLY VARIABLE CENTER FREQUENCY
CONTINUOUSLY VARIABLE SWEEP WIDTH
ATTENUATION (Optional): 0 - 10 db, in 1 db steps
0 - 33 db, in 3 db steps
0 - 60 db, in 10 db steps
5 db variable RF Level Control

MARKERS (Optional): (Customer Selected)
Birdie Type
Up to six single frequency
Up to five harmonic frequency

KAY ELECTRIC COMPANY
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STANDARD 1484-A

The 1484-A offers premium sweep and marker characteristics in a solid state, limited range (e.g., 10.7 MHz FM, 45 MHz TV, 88-108 MHz FM, etc.) production oriented unit. Frequencies may be selected up to 1 GHz and pulse markers, CW and harmonic birdie markers, RF turn-off markers or post-injection markers may be specified. A four position band switch selects portions of the band as desired and remote control of band and tuning can be provided.

The unit is completely solid-state using epoxy printed circuit modules for easy maintenance and inspection. The 1484-A is housed in a small, lightweight cabinet for portability.

SPECIFICATIONS

STANDARD 1484-A

FREQUENCY RANGE: Selectable to 1 GHz

RF OUTPUT: 1.0 V rms into 50 ohms or 75 ohms

SWEEP RATE: 5 to 60 Hz, locks at line

FLATNESS: ±.25 db overall

DISTORTION: Typically 30 db down

CALIBRATED CENTER FREQUENCY DIAL

CONTINUOUSLY VARIABLE CENTER FREQUENCY

CONTINUOUSLY VARIABLE SWEEP WIDTH

ATTENUATION (Optional): (Provision For 2)
0 - 10 db in 1 db steps
0 - 33 db in 3 db steps
0 - 60 db in 10 db steps
RF Level Variable — 5 db

MARKERS (Optional):
Pulse
RF turn-off
Post injection
CW birdie
Harmonic birdie

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KAY NEW

SELF-GATING RF PULSER

TECHNICAL DATA

OCTOBER, 1968

- DISPLAYS EACH CYCLE OF FAST RF PULSES
- PROVIDES PHASE CONTROLLED, PHASED COHERENT PULSED RF SIGNALS
- REVEALS CHANGES IN WAVESHAPE FOR PULSED RF
- REVEALS CHANGES IN PHASE FOR PULSED RF
- PROVIDES COMPLETE CYCLES, NO SAMPLING GAPS.

Model 5070-BI

A unique, self-gating system permits the observation and measurement of changes in RF signal under pulsed RF conditions. Circuit distortions and delays, impedance mismatches at both long and very short distances, precise variations within the RF pulse can be quickly and accurately detected.

Special features include a continuous variable phase control over a minimum of 2 cycles and a choice of 5 repetition rates under self-gating conditions. The typical range of these rates would be as follows:

FREQUENCY RANGE	REPETITION RATES	
	Minimum	Maximum
10-16 MHz	140 Hz	3.7 KHz
16-25 MHz	230 Hz	5.8 KHz
25-40 MHz	370 Hz	9.2 KHz
40-65 MHz	540 Hz	14.9 KHz
65-120 MHz	900 Hz	31 KHz

Through the use of IC circuitry, this technique is available as an option on the Kay 5070-B, 10-120 MHz standard pulse RF generator.

OTHER MODELS AVAILABLE

Two additional models are available as follows:

The Model 5071-A offers a wider frequency range of 10-250 MHz.

The Model 5072-A expands the standard 5070-B to provide carrier-off levels of up to 95 db.

MODEL 5070-B

The 5070-B is a fully transistorized instrument whose pulsed output features sharp rise and decay and flat tops. The unit will also serve as a CW generator, as well as a video pulse generator. It provides a stable CW signal from 10 MHz to 120 MHz, continuously variable, in five overlapping bands. The direct reading frequency dial is calibrated to $\pm 1\%$.

100 ns to 100 μs PULSE GENERATOR

The video pulse generator incorporated in the 5070-B provides pulses with a wide range of continuously variable pulse widths from 100 ns to 100 μs with less than 20 ns rise and decay times. Pulse repetition rates are continuously variable from 50 to 5000 pps. The pulses may be triggered either by the internal multivibrator or an external source of only 2 volts. Maximum output is plus or minus 3 volts into a 50 ohm load. A sync pulse is supplied which precedes the output pulse by approximately 40 ns.

10 ns, RISE, 80 db OFF

The combination of oscillator and pulse generator with a diode switch and carefully buffered output stages provides a pulsed RF output. The features of flat, pulsed RF, continuously variable frequency, sharp 10 ns rise and decay time, and low leakage provide for reliable and accurate measurements. The RF output is help at the same peak levels during either CW or pulsed RF operation. The carrier pulses are flat (including overshoot) within $\pm 5\%$ and the rise and decay times are less than 70 db (to 85 db) below the carrier level at all frequencies within the normal range of the instrument. The diode switch, in addition to being driven from the internal oscillator and pulse generator, can be driven by an external pulse source and/or an external RF source.

KAY ELECTRIC COMPANY
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SPECIFICATIONS

CARRIER FREQUENCY RANGE:	10 to 120 MHz with a direct reading dial in 5 overlapping ranges with an accuracy of ±1%.
OUTPUT AMPLITUDE:	a) CW 0.5 volts rms into 50 ohms; b) Pulsed R-F — Carrier level — 0.5 volts into 50 ohms; c) Video pulse — Plus or minus 3 volts peak into 50 ohms.
CARRIER-OFF LEVEL:	85 db to 30 MHz, 80 db to 70 MHz, 70 db to 120 MHz.
PULSED CARRIER RISE AND DECAY TIMES:	Less than 10 ns.
VIDEO PULSE RISE AND DECAY TIMES:	Less than 20 ns.
PULSE REPETITION RATE:	50 pps to 5000 pps.
PULSE WIDTH:	100 ns to 100 μs.
ATTENUATOR:	101 db in 1 db steps plus approximately a 6 db continuous variation.
SYNC OUTPUT:	2.5 volts peak into 50 ohms with 20 ns rise time. Sync pulse precedes the output pulse by approximately 40 ns.
EXTERNAL TRIGGER INPUT:	Approximately a +2 volt pulse required.
POWER SUPPLY:	117 volt ±10%, 50-60 Hz. Power consumption approximately 15 watts. All supply voltages electronically regulated.
PRICES:	MODEL 5070 BI $ 1,295.00 MODEL 5070 B $ 930.00

THE RF PULSER UNITS CAN BE SUMMARIZED AS FOLLOWS:

The 5070-B is the basic unit which we have offered for the last few years. Its most important characteristics are:

FREQ. RANGE:	10 - 120 MHz
CARRIER OFF LEVEL:	85 db to 30 MHz 80 db to 70 MHz 70 db to 120 MHz

The price of the 5070-B is $930.

The 5070-B1 is a 5070-B with an added self-gating system to synchronize the individual cycles of the pulsed RF signal. This is described on the 5070-B1 data sheet. All specifications of the 5070-B apply and the price is $1295.

The 5071-A and 5072-A units are slightly different versions of the 5070-B. Both of these units provide higher RF turn-off ratios than the 5070-B, provide two sync pulses instead of one, but do not provide a video pulse output. In addition, the 5071-A has an expanded frequency range of from 10 - 250 MHz.

The main specifications for the 5071-A are:

FREQ. RANGE:	10 - 250 MHz
FREQ. BANDS:	10 - 18 MHz, 18 - 35 MHz, 35 - 68, 68 - 120 MHz and 120 - 250 MHz.
DIAL ACCURACY:	±1%
SYNC OUTPUT:	

SYNC PULSE #1

OUTPUT:	+ 4 volts into 50 ohms
RISE & DECAY:	less than 30 nsec
WIDTH:	Approx. 1μsec
TIMING:	Sync pulse #2 delayed from sync pulse #1. Delay can be varied by a panel control from approx. 250 nsec to 100 μsec.

SYNC PULSE #2

OUTPUT:	+ 1 volt into 50 ohms
RISE & DECAY:	20 nsec
WIDTH:	120 nsec
TIMING:	RF pulse delayed from sync pulse #2 by a fixed delay of approx. 60 nsec.

The variable time delay feature of the sync pulses in the 5071-A and 5072-A units is very useful for simultaneous operation of 2 or more units. The pulse generators can be adjusted to work from a common external sync pulse and provide pulsed RF output at the same timing, but with frequencies individually set.

EXTERNAL TRIGGER INPUT:	+ 2 volts
CARRIER OFF LEVELS:	95 db to 100 MHz 90 db to 150 MHz 80 db to 200 MHz 76 db to 250 MHz

The price of the 5071-A is $1295.

The 5072-A characteristics are the same as the 5071-A, except for the frequency range. The 5072-A covers 10 - 120 MHz and the price is $1195.

There are some minor panel changes in the 5071-A and 5072-A, as compared to the 5070-B. The major change is the use of a miniaturized output attenuator in the 5071-A and 5072-A units.

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(219) 272-2848

West Coast Office
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Goleta, Calif. 93017
(805) 967-9316

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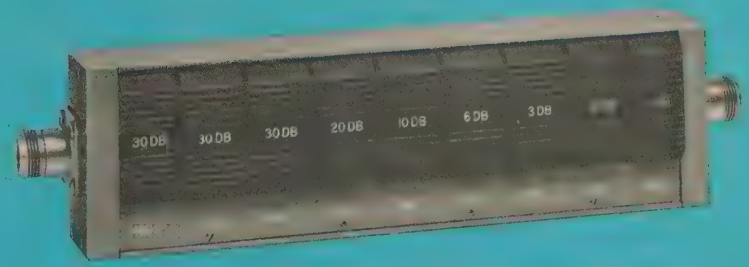
PRECISION ATTENUATORS

FROM
KAY's
Attenuator Workshop

The wide attenuation range and flexible controls of in-line attenuators are boosted to the 4GHz region by a unique, segmented, intrinsic, switch-cavity assembly. New operating specs approach and rival the performance of fixed coaxial pads. However, no cumbersome coupling and uncoupling are required nor are awkward twist and shift mechanics needed. A simple slide switch operation controls individual steps of 1, 2, 3, 6, 10, 20, 30, 30, 30 db.



New...DC-4GHz
COAXIAL ATTENUATOR

0-132 db in switched 1 db steps

SERIES 110

- DC-4 GHz
- 0-132 DB IN 1 DB STEPS
- OVERALL ACCURACY: 2% up to Max. of 1 db at 1 GHz
  5% up to Max. of 5 db at 4 GHz
- MAXIMUM VSWR: 1.15:1 to 1 GHz
  1.9:1 to 4 GHz
- TYPICAL INSERTION LOSS: $\leq$.2 db at 1 GHz
  $\leq$.6 db at 4 GHz

Controls: Slide Switches
Connectors: Type N
Dimensions: 8 3/8" x 2 3/8" x 1 5/8"

SERIES 20

431C 441B 451B

SERIES 30

432D 442C 452C

Kay in-line attenuators are designed to provide a means of inserting an accurate and fixed amount of loss in circuits operating in the DC - 1 GHz range. Attenuation is controlled by field-proven high-frequency toggle switches. Solid silver contacts set in teflon for low loss and superior match are employed throughout. The precision resistors used are 1% tolerance, carbon film resistors. The maximum total error is very low and incidental insertion loss is negligible. These units have met rigid environmental tests and are traceable to N. B. S.

The Series 20 in-line, toggle-type attenuators provide 41 db* of attenuation in six precise steps of 20, 10, 5, 3, 2, and 1 db. Similar to the Series 20, the Series 30 Attenuators provide 101 db of attenuation including three additional 20 db steps. Both series are available in either 50, 75, or 90 ohm characteristic impedance. The individually-switched steps are isolated in broad-tuned, shielded compartments, providing high accuracy and a flat frequency response over the specified range. All models are symmetrical, (bi-directional), attenuators.

SERIES 70

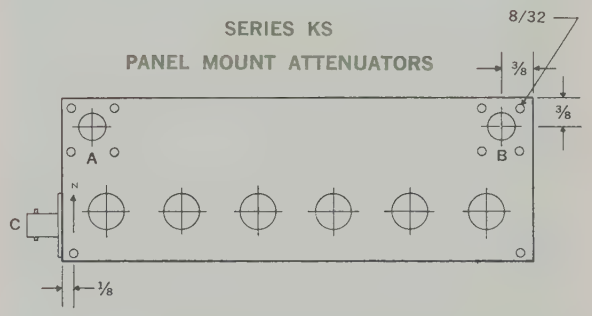
1/432C 1/442C 1/452C

The Series 70 models are vernier attenuators which provide fine control of attenuation when used as a separate unit or in series with Kay 1 db step attenuators. It provides 22.1 db of attenuation in precise .1 db increments and is available in 50, 75, or 90 ohms impedance.

SERIES 90

439A 449A 459A

Kay's new in-line miniature attenuators, the 90 Series, provide from zero to 101 db of attenuation in precise 1 db steps. Miniature, high-frequency toggle switches featuring solid-silver contacts set in teflon, are positioned in highly shielded compartments, substantially reducing the maximum total error and minimizing incidental insertion loss. The 90 Series covers a range from DC to 1 GHz and is available in either 50, 75, or 90 ohm impedance. This rugged, compact attenuator weighs only 8 oz. and is less than 6¼ inches long, including BNC-Type connectors.

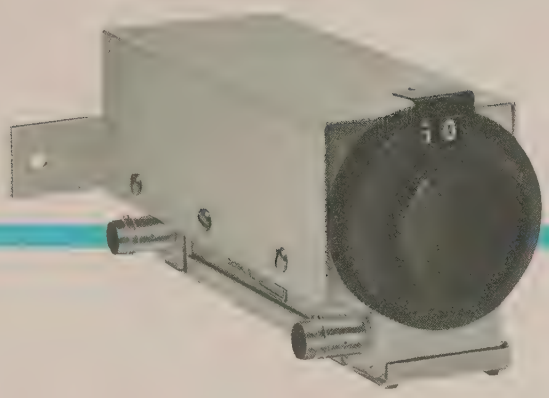


To afford maximum utility, Kay in-line attenuators are available for your special built-in applications. These attenuators area ideally suited for inclusion in a wide variety of equipment, such as test equipment, IF amplifiers, receivers, etc. In general, the electrical specifications are the same as for the in-line model. They differ, however, in mechanical configuration.

These models are designed to be mounted as shown with "for mounting" holes tapped for an 8/32 by 3/8 inch machine screw centered 1/8 inch from each edge. The placement of connector mounting is left to the customer. One end-mounted terminal and one front-mounted terminal are located as indicated in the drawing by "C" and "B", or two front-mounted terminals may be specified as indicated by "A" and "B". Prices are available on request to the factory.

*The Series 20 attenuators may also be purchased with a fixed, accurate, 10 db insertion loss. Specify Catalog No. 430B (50Ω), 440B (70Ω), or 450B (90Ω).

© Kay Electric Company 1967



SERIES 40
433A

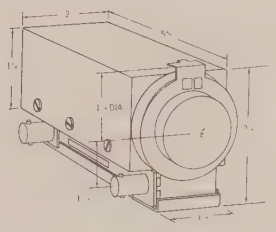
SERIES 50
434A 444A 454A

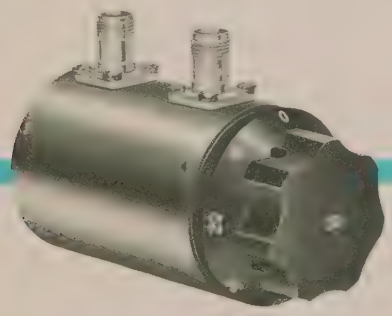
Kay's Series 40 and 50 Attenuators are dual-rotary units which provide highly precise ranges of attenuation from zero to 119 db or zero to 99 db, respectively, in precise 1 db steps. These models adapt our precise in-line toggle attenuator pads to rotary style control with direct reading, digital, attenuation indicator.

The Series 50 makes available the superior operating characteristics of the Kay miniature in-line units in a mechanical configuration requiring very little front panel area, as well as providing simplified reading. It provides 0-99 db of attenuation in 1 db steps, a range *previously* requiring two or more attenuators, each one of equal or *greater size*, and *greater* insertion *loss*.

The Series 50 units are adapted for on the bench or behind the panel mounting. Quality is controlled by using only custom switches, featuring solid-silver contacts, and precise—1% tolerance—carbon film resistors.

The Series 40 provides precise 1 db steps of attenuation from 0-119 db and features silver enclosures and switch contacts for low loss and superior match. The standard Series 40 Attenuator has 50Ω characteristic impedance. 75 and 90 ohm models are available upon special request.



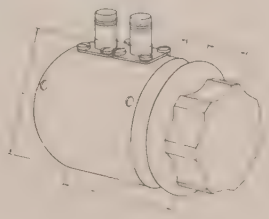


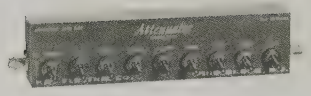
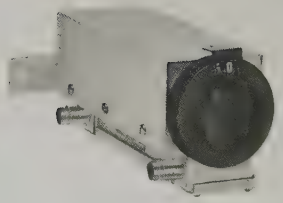
SERIES 60
435A 436A 1/435A

The Series 60 Attenuators are DC to 1300 MHz rotary, decimal-step attenuators providing 0.1 db, 1.0 db, and 10 db, steps in single units of 1.0, 10, and 60 db. Combinations of units are also available.

These new rotary attenuators adapt the configuration of *precision pi pads in individually tuned and shielded cavities* used so successfully in Kay in-line attenuators. Printed circuit techniques have been employed to provide high-frequency switching with new low mechanical stress and the lasting contact qualities of beryllium and coin silver. Low insertion loss, high accuracy, excellent VSWR and, all important, repeatability in measurements, provide for reliable and inexpensive attenuators over an extended frequency range.

The Series 60 units are small and are designed primarily for panel mounting. A standard ball bearing detent mechanism is used.



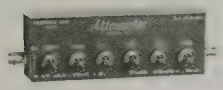



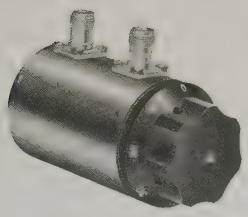
50 OHM ATT

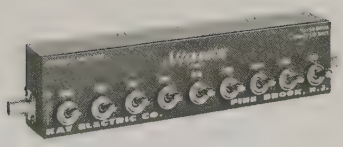
Attenuation Range	0-101 db in one db steps	0-41* db in one db steps	0-22.1 db 0.1 db steps	0-132** db in one db steps	0-119 db in one db steps
Attenuation Steps (db)	9 Steps 1, 2, 3, 5, 10, 20, 20, 20, 20	6 Steps 1, 2, 3, 5, 10, 20	9 Steps .1, .2, .3, .5, 1, 2, 3, 5, 10	9 Steps 1, 2, 3, 6, 10, 20, 30, 30, 30	9 Steps, 1 db 11 Steps, 10 db
Frequency	DC to 1 GHz			DC to 1 GHz	
Type of Controls	In-line Toggle Switches (Coin-silver contacts in molded Teflon)			Miniature In-line	Dual-
Typical Overall Accuracy ±	0.6 db: 0-.25 GHz 1.2 db: .25-.5 GHz 2.0 db: .5-1 GHz	0.5: 0-.25 GHz 0.9: .25-.5 GHz 1.2: .5-1 GHz	5% at .1 GHz .5 db at .25 GHz	1.0 db: 0-.5 GHz 1.5 db: .5-1 GHz	.6 db: 0-.25 G 1.2 db: .25-.5
Maximum VSWR	1.2:1, 0-.25 GHz 1.4:1, .25-1 GHz	1.2:1, 0-.25 GHz 1.4:1, .25-1 GHz	1.2:1, 0-.25 GHz	1.2:1, 0-.5 GHz 1.4-1, .5-1 GHz	1.2:1, 0-.25 G 1.4-1, .25-.5 G
Insertion Loss 0 - 250 MHz 250 - 500 MHz 500 - 1000 MHz At 4 GHz Typical (db)	≤.1 ≤.2 ≤.6	≤.1 ≤.1 ≤.5	≤.1	≤.2 ≤.35 ≤.7	≤.1 ≤.2
Power (watts)	1	1	1	½	½
Dimensions (inches)	2 x 9¾ x 2	2 x 7 x 2	2 x 9¾ x 2	1¼ x 6¼ x ⅞	5 dia. x 2¼
Weight	3 lbs.	2 lbs.	3 lbs.	8 oz.	3 lbs. 8 oz.
Catalog No.	432D	431C	1/432C	460A	433A

*Also available with fixed 10 db loss. Specify 430B — **$85**

Also available from 0-101 db in one db steps — 439A — **$120 and 0-102.5 db in 0.5 db steps — 437A — **$145**







TENUATORS

	0-99 db in one db steps	0-10 db in one db steps	0-60 db in ten db steps	0-1 db in 0.1 db steps	0-132 db in 1 db Steps
a. a.	9 Steps, 1 db ea. 9 Steps, 10 db ea.	10 Steps 1, 2, 3, 4, 5, 6, 7, 8, 9, 10	6 Steps 10, 20, 30, 40, 50, 60	10 Steps .1, .2, .3, .4, .5, .6, .7, .8, .9, 1.0	9 Steps 1, 2, 3, 6, 10, 20, 30, 30, 30
		DC to 1.3 GHz			DC-4 GHz
otary, Digital		Rotary-Step			In-Line Slide Switches
z Hz	.6 db: 0-.5 GHz 1.5 db: .5-1 GHz	.2 db: 0-.3 GHz .3 db: .3-1 GHz	2% at .3 GHz 5% at 1 GHz	.025 db: 0-.5 GHz .05 db: .5-1 GHz	2% to max. 1 db — 1 GHz 2% to max. 1.5 db — 2 GHz 3% to max. 3 db — 3 GHz 5% to max. 5 db — 4 GHz
z z	1.2:1, 0-.5 GHz 1.4:1, 5.-1 GHz	1.1:1, 0-.3 GHz 1.3-1, .3-1 GHz		1.1:1, 0-.3 GHz 1.4:1, .3-1 GHz	1.15:1, 0-1 GHz 1.9:1 at 4 GHz
	≤.2 ≤.6 ≤1.0	≤.1 ≤.1 ≤.2	≤.1 ≤.1 ≤.2	≤.1 ≤.1 ≤.1	≤.2 ≤.6
	1	1	½	1	1
	2¼ x 2 x 5¾	2 dia. x 2⅛	2 dia. x 2⅞	2 dia. x 2⅛	8⅜ x 2⅜ x 1⅝
	2 lbs.	1 lb.	12 oz.	12 oz.	2½ lbs.
	434A	435A	436A	1/435A	461A

75 OHM ATTENUATORS

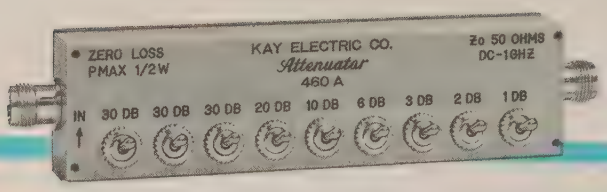
Attenuation Range	0-101 db in one db steps	0-41 db in one db steps	0-22.1 db in 0.1 db steps	0-132 db in one db steps	0-99 db in one db steps
Attenuation Steps (db)	9 Steps 1, 2, 3, 5, 10, 20, 20, 20, 20	6 Steps 1, 2, 3, 5, 10, 20	9 Steps .1, .2, .3, .5, 1, 2, 3, 5, 10	9 Steps 1, 2, 3, 6, 10 20, 30, 30, 30	9 Steps of 1 db each 9 Steps of 10 db each
Type of Controls	In-line Toggle Switches (Coin-silver contacts in molded Teflon)			Miniature In-line	Dual-Rotary, Digital
Typical Overall Accuracy (±)	1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz	.5 db: 0-.25 GHz 1.2 db: .25-.5 GHz	5% at .1 GHz 10% at .25 GHz	1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz	1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz
Maximum VSWR	1.2:1 0-.25 GHz 1.4-1 .25-.5 GHz	1.2:1 0-.25 GHz 1.4:1 .25-.5 GHz	1.4:1 0-.25 GHz	1.2:1 0-.25 GHz 1.4:1 .25-.5 GHz	1.2:1 0-.25 GHz 1.4:1 .25-.5 GHz
Insertion Loss 0 - 250 MHz 250 - 500 MHz Typical (db)	≤.1 ≤.2	≤.1 ≤.2	≤.1	≤.1 ≤.2	≤.1 ≤.2
Dimensions (inches)	2 x 9¾ x 2	2 x 7 x 2	2 x 9¾ x 2	1¼ x 6¼ x ⅞	2¼ x 2 x 5¾
Weight	3 lbs.	2 lbs.	3 lbs.	8 oz.	2 lbs
Catalog No.	442C	441B	1/442C	470A	444A

Impedance: 75 ohms
Frequency: DC to 500 MHz+
Power: ½ watt

90 OHM ATTENUATORS

0-101 db in one db steps	0-41 db in one db steps	0-22.1 db in 0.1 db steps	0-132 db in one db steps	0-99 db in one db steps	Attenuation Range
9 Steps 1, 2, 3, 5, 10, 20, 20, 20, 20	6 Steps 1, 2, 3, 5, 10, 20	9 Steps .1, .2, .3, .5, 1, 2, 3, 5, 10	9 Steps 1, 2, 3, 6, 10, 20, 30, 30, 30	9 Steps of 1 db each 9 Steps of 10 db each	Attenuation Steps (db)
In-line Toggle Switches (Coin-silver contacts in molded Teflon)			Miniature In-line	Dual-Rotary Digital	Type of Controls
1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz	.5 db: 0-.25 GHz 1.2 db: .25-.5 GHz	5% at .1 GHz 10% at .25 GHz	1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz	1.0 db: 0-.25 GHz 2.0 db: .25-.5 GHz	Typical Overall Accuracy (±)
1.3:1 0-.25 GHz 1.5:1 .25-.5 GHz	1.3:1 0-.25 GHz 1.5:1 .25-.5 GHz	1.4:1 0-.25 GHz	1.3:1 0-.25 GHz 1.5:1 .25-.5 GHz	1.3:1 0-.25 GHz 1.5:1 .25-.5 GHz	Maximum VSWR
≤.1 ≤.2	≤.1 ≤.2	≤.1	≤.1 ≤.2	≤.1 ≤.2	Insertion Loss 0 - 250 MHz 250 - 500 MHz Typical (db)
2 x 9¾ x 2	2 x 7 x 2	2 x 9¾ x 2	1¼ x 6¼ x ⅞	2¼ x 2 x 5¾	Dimensions (inches)
3 lbs.	2 lbs.	3 lbs.	8 oz.	2 lbs.	Weight
452C	451B	1/452C	480A	454A	Catalog No.

Impedance: 90 ohms
Frequency: DC to 500 MHz+
Power: ½ watt



SERIES 100

460A 470A 480A

SERIES 120

437A 447A 457A

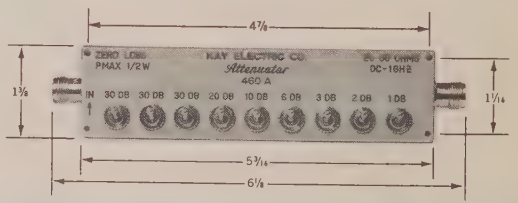
The Series 100 and 120 attenuators are small, compact, lightweight units that can be held by a cable connector, or be mounted on less than 1¼" x 5" of panel space.

These new miniature in-line attenuators provide from 0-132 db in one db steps (100 series) and from 0-102.5 db in 0.5 db steps (120 series). Both models feature Kay's proven miniature RF toggle switches and precision 1% resistors carefully arranged in highly-shielded broad-tuned compartments. These models also offer:

- WIDE FREQUENCY RANGES
- WIDE ATTENUATION RANGES
- ZERO INSERTION LOSS

SERIES 100
- DC-1GHz
- 0-132 db in 1 db steps

SERIES 120
- DC-1GHz
- 0-102.5 db in 0.5 db steps



KAY ELECTRIC COMPANY

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Goleta, Calif. 93017
(805) 967-9316

**Shipping Address: U.S. Route 31 North, South Bend, Indiana
*Shipping Address: 820 Wallace Becknell Road, Santa Barbara Airport, Goleta, California

ORDERING INFORMATION

All orders and quotation requests may be sent either to the main office in Pine Brook, New Jersey, our offices listed above or any Kay rep office. Terms are Net 30 days; Cash Discount ½% 10 days. Replacement parts are net only. Shipments are made on open account where credit has been established, against payment in advance when offered, or C.O.D. Prices quoted are Net and FOB Pine Brook, New Jersey. FOB prices overseas are available from overseas offices. U.S. funds are required for payment.

Prices and specifications are subject to change without notice. Minimum order is $10 (for orders of less than $10, add $1 for handling). Instruments are individually packed and shipped via Railway Express unless otherwise requested.

WARRANTY

Each new instrument manufactured and/or sold by us is warranted to be free from defects in material and workmanship. Our responsibility is limited to repairing (or replacing) any instrument or part thereof (except tubes) for a period of one year when, in our opinion, the repair or replacement is covered by this warranty. Tubes are warranted for a period of three months from date of shipment against failure because of defective material.

REPAIRS

A stock of spare parts is maintained and is available to our customers. The factory will repair, at no charge, equipment which, in our opinion, is covered by our warranty; and at standard rates in cases which, in our opinion, are not covered by our warranty.

6336-50M-667

PRINTED IN U.S.A.

KAY

0-41DB PRECISION IN-LINE ATTENUATOR

TECHNICAL DATA

OCTOBER, 1968

Series 20

Kay's Series 20 in-line toggle-type attenuators are designed to provide a means of inserting a fixed and accurate 41 db of loss in circuits operating from DC - 1 GHz. Attenuation in these models is controlled by Kay's own field-proven high-frequency toggle switches. Fine silver contacts are gold-plated for durability, and set in teflon for low loss and superior match. Each individual Pi pad, using only precision, 1% carbon-film resistors, is isolated in broad-tuned, shielded compartments, providing high accuracy and a flat frequency response over the specified range. The maximum total error is low and incidental insertion loss is negligible. These units have met rigid environmental tests and are traceable to N.B.S.

IMPEDANCE	50Ω	75Ω	90Ω
ATTENUATION RANGE	0 - 41* db in one db steps		
ATTENUATION STEPS (db)	6 Steps 1, 2, 3, 5, 10, 20		
FREQUENCY	DC to 1 GHz	DC - 500 MHz	
TYPE OF CONTROLS	In-line Toggle Switches		
TYPICAL OVERALL ACCURACY ±	0.5: 0-.25 GHz 0.9: .25..5 GHz 1.2: .5-1 GHz	0.5 db: 0-.25 GHz 1.2 db: .25-.5 GHz	
MAXIMUM VSWR	1.2:1, 0-.25 GHz 1.4:1, .25-1 GHz	1.2:1, 0-.25 GHz 1.4:1, .25-.5 GHz	1.3:1, 0-.25 GHz 1.5:1, .25-.5 GHz
INSERTION LOSS 0 - 250 MHz 250 - 500 MHz 500 - 1000 MHz Typical (db)	 <.1 <.1 <.5	 <.1 <.2	
POWER (watts)	1	½	½
DIMENSIONS (inches)	2 x 7 x 2		
WEIGHT	2 lbs.		
PRICE	$80		
CATALOG NO.	431-C*	441-B*	451-B*
*WITH FIXED ¡0 db INSERTION LOSS SPECIFY:	430-B	440-B	450-B

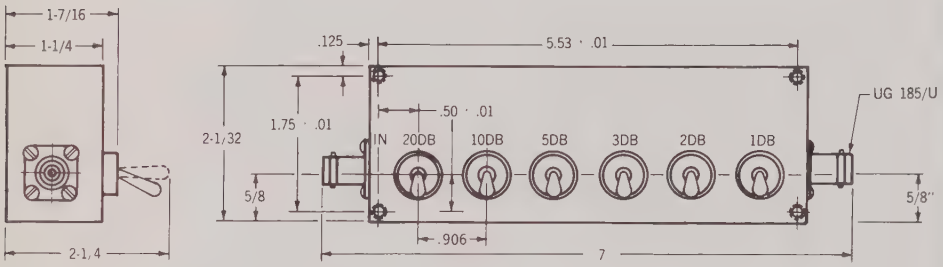
KAY ELECTRIC COMPANY
Maple Avenue • Pine Brook, New Jersey 07058

SERIES 20 IN-LINE MODELS

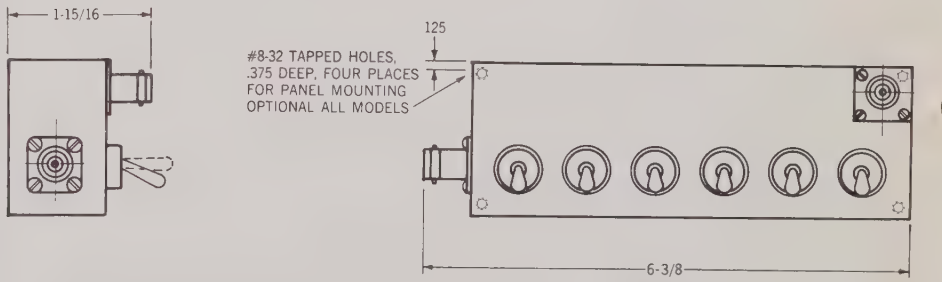
The Series 20 covers attenuator models 431-C, 441-B, 451-B (standard models), and 430-B, 440-B, and 450-B (standard models with fixed 10 db insertion loss). It also includes the KS panel mount versions in 50, 75, and 90 ohms characteristic impedance. BNC connectors are standard.

Variations of the Series 20 — special connectors, steps, ranges and mounting arrangements — are available to suit customer requirements. Please contact the nearest Kay office listed below for more information.

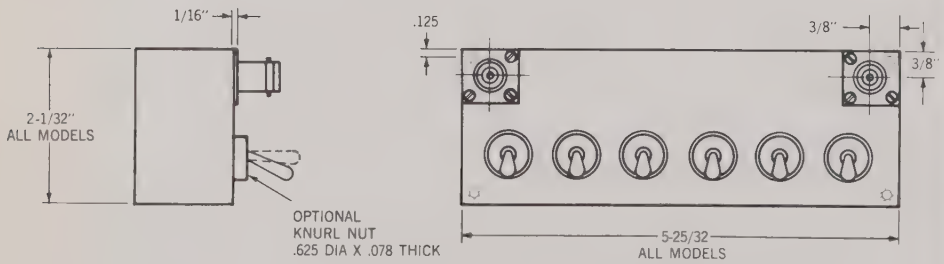
STANDARD SERIES 20 WITH PANEL MOUNTING HOLES



SERIES 20KS WITH CONNECTORS IN THE "B" AND "C" POSITIONS



SERIES 20KS WITH CONNECTORS IN THE "A" AND "B" POSITIONS



ALL DECIMAL DIMENSIONS ± .005
"FRACTIONAL" · 1/64

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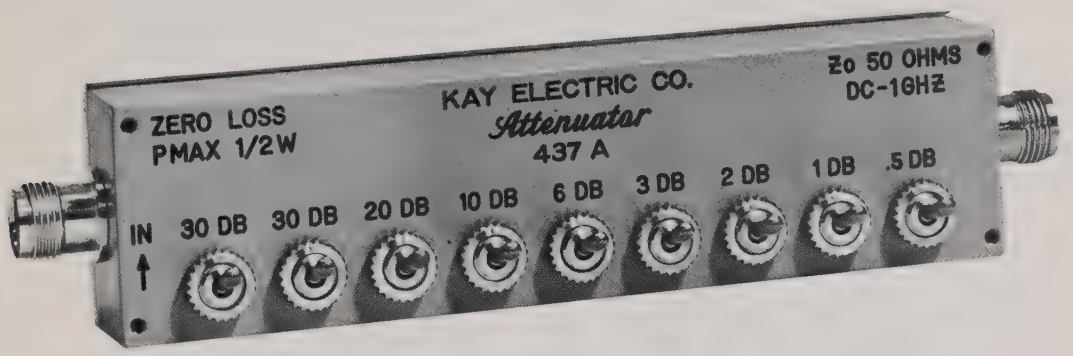
KAY NEW LOW-COST

0-102.5 DB MINIATURE ATTENUATOR

TECHNICAL DATA **OCTOBER, 1968**



Model 437-A

The Model 437-A is a small, compact, lightweight unit that can be held by a cable connection or mounted on less 1¼" x 5" of panel space.

This miniature in-line unit provides 102.5 db of attenuation in 0.5 db steps. Operating in the DC - 1 GHz range, the 437-A features Kay's proven miniature toggle switches. Each step consists of a precision pi pad incorporating 1% resistors in a broad-tuned, highly shielded compartment.

SPECIFICATIONS

FREQUENCY RANGE:	DC - 1 GHz
ATTENUATION RANGE:	0 - 102.5 db
TYPICAL OVERALL ACCURACY:	1.0 db, 0.5 GHz 1.5 db, .5 - 1 GHz
MAXIMUM VSWR:	1.2:1, 0 - .5 GHz 1.4:1, .5 - 1 GHz
INSERTION LOSS:	0 - .25 GHz, ±0.05 db .25 - .5 GHz, ±0.2 db .5 - 1 GHz, ±0.5 db
POWER (watts):	½ W
CONTROLS:	Miniature high frequency toggle
DIMENSIONS:	1⅜" x 6⅛" x ⅞"
WEIGHT:	8 oz.
PRICE:	$145.00

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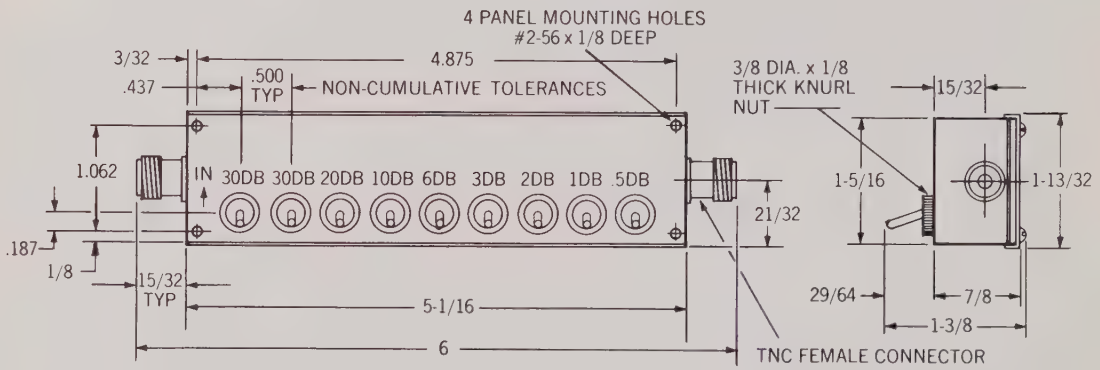
MINIATURE ATTENUATOR MODEL 437A



TOLERANCES: FRACTIONAL · 1/64
DECIMAL · .005

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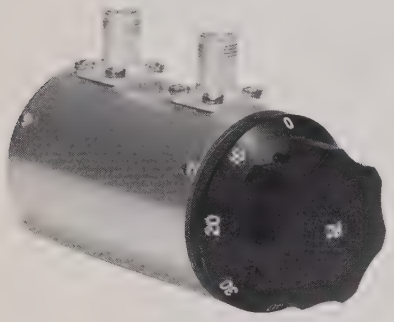
KAY **NEW**

DC-2GHz ROTARY ATTENUATORS

TECHNICAL DATA **MAY 1969**



- **EXTENDED FREQUENCY COVERAGE**
- **EXTREMELY HIGH ACCURACY**
- **EXTREMELY LOW LOSS AND VSWR**
- **EXCELLENT REPEATABILITY**
- **NOW AVAILABLE IN 75 Ω TO 1 GHz**

A new improved version of Kay's precision rotary-step attenuators is now available extending the frequency coverage of the 50 ohm models to 2 GHz with improved accuracy and insertion loss. Models 445A and 446A have recently been introduced to provide 75 ohm impedance units in the DC — 1 GHz region. Decimal step models, 1/435A and 1/445A provide 0-1 db attenuation levels in .1 db increments.

These new rotary attenuators adapt the configuration of precision pi pads in individually tuned and shielded cavities used so successfully in Kay in-line attenuators. Printed circuit techniques have been employed to provide high-frequency switching with new low mechanical stress and the lasting contact qualities of gold and silver. Low insertion loss, high accuracy, excellent VSWR and, all important, repeatability in measurements, provide for reliable and inexpensive attenuators over an extended frequency range.

All models are small and are designed primarily for panel mounting. A standard ball bearing detent mechanism is used.

Combinations of units are available in a compact cabinet for bench operation.

SPECIFICATIONS

MODEL		435-A	436-B	445A	446B
ATTENUATION RANGE		0-10 DB in 1 DB steps	0-70 DB in 10 DB steps	0-10 1 DB Steps	0-70 DB in 10 DB Steps
FREQUENCY		DC-2 GHz	DC-2 GHz	DC-1 GHz	DC-1 GHz
IMPEDANCE		50 ohm	50 ohm	75 ohm	75 ohm
TYPICAL OVERALL ACCURACY (±DB) OR % OF INDICATED DB	DC-250 MHz	0.1	±(1% + .1)	0.2	±2%
	250-500 MHz	0.1	±(1% + .1)	0.2	±2%
	500-1000 MHz	0.3	±(1% + .2)	0.4	±5%
	1-2 GHz	0.5	±5%	—	—
MAXIMUM VSWR	DC-250 MHz	1.1:1	1.1:1	1.2:1	1.2:1
	250-500 MHz	1.2:1	1.2:1	1.2:1	1.2:1
	500-1000 MHz	1.3:1	1.3:1	1.25:1	1.3:1
	1-2 GHz	1.5:1	1.5:1	—	—
INSERTION LOSS (db)	DC-250 MHz	.1	.1	.2	.2
	250-500 MHz	.1	.1	.2	.2
	500-1000 MHz	.2	.2	.3	.4
	1-2 GHz	.5	.5	—	—
POWER (watts), AVERAGE		1	½	½	½
POWER, PEAK		1 KW	500W	500W	500W
CONNECTORS		BNC or TNC		AMPHENOL 27-21	
DIMENSIONS (inches)		2" dia. x 2⅛"	2" dia. x 2⅞"	2" dia. x 2⅛"	2" dia. x 2⅞"
PRICE		$90.00	$90.00	$90.00	$90.00

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KAY NEW

0-120DB, 0-12DB ROTARY ATTENUATORS

TECHNICAL DATA

OCTOBER, 1968

- EXTREMELY LOW LOSS AND VSWR
- HIGH ACCURACY
- LIGHTWEIGHT
- COMPACT

Model 464 & 467

DC-1.3 GHz ROTARY ATTENUATORS

A new, more compact rotary design provides accurate attenuation from DC to 1.3 GHz. The Model 464-A (0 to 120 db in 10 db steps) and the Model 467-A (0 - 12 db in 1 db steps) both adapt the proven Kay miniature in-line toggle switch attenuators to the convenience of rotary action. Each pad is inserted and removed by a unique positive action cam arrangement.

The units are bidirectional and may be interconnected to provide 132 db of attenuation in convenient 1 db steps. Their overall size permits a wide variety of panel mounting applications. They may also be useful as bench top units for laboratory work.

SPECIFICATIONS

	MODEL 464	MODEL 467
FREQUENCY RANGE	DC - 1.3 GHz	DC - 1.5 GHz
ATTENUATION RANGE	0 - 120 db, 10 db steps	0 - 12 db, 1 db steps
OVERALL ACCURACY	±1 db to 500 MHz ±1.5 db to 1.3 GHz	±.3 db to 1 GHz ±.5 db to 1.5 GHz
MAXIMUM VSWR	1.2:1; 0-.5 GHz 1.5:1; .5-1.3 GHz	1.25:1 to 1 GHz
INSERTION LOSS	.05 db/100 MHz	.05 db/100 MHz
POWER CAPABILITY	1 watt at 40° C.	1 watt at 40° C.
DIMENSIONS	1¾" x 3 7/16" x 2 11/16"	
PRICE	$150.00	

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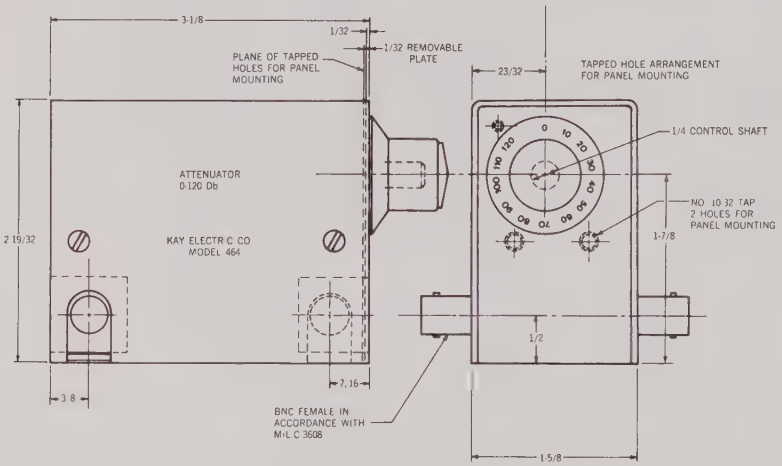
MODEL 464A
MODEL 467A
ROTARY ATTENUATORS

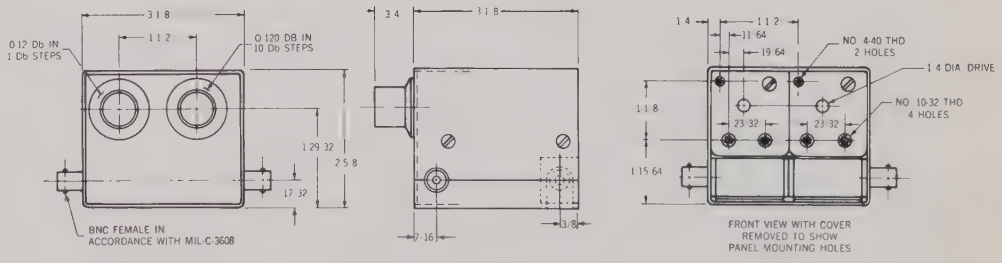
This technical bulletin covers the Model 464-A and 467-A Rotary Attenuators. These models may be supplied as individual units or can be combined in series as shown below to provide 0 - 132 db of attenuation in precise 1 db steps. BNC connectors are standard. Variations of these models — special connectors, steps, impedances, and mounting arrangements — are available to suit customer requirements.

For more information please contact the nearest Kay office listed below.

OUTLINE DIMENSIONS FOR SINGLE UNIT MODEL 464-A OR 467-A



OUTLINE DIMENSIONS FOR COMBINED MODELS 464-A AND 467-A 0-132 DB IN 1 DB STEPS



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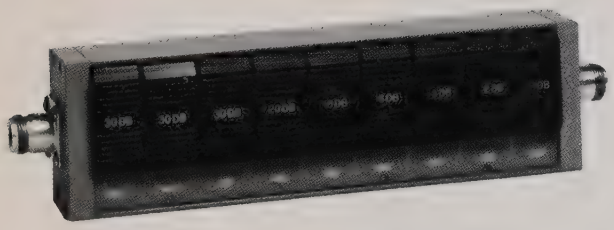
KAY NEW

DC-4GHz COAXIAL ATTENUATOR

TECHNICAL DATA

NOVEMBER, 1968



MODEL 461A

- **LOCKED-IN-PLACE STABILITY**
- **HIGH ACCURACY**
- **LOW LOSS**

A new, coaxial, in-line attenuator has recently been introduced by Kay Electric Company to span the DC — 4 GHz range. Developed from Kay's precision VHF-UHF attenuators, the new Model 461A provides any combination of 1 db stepped increments over a wide 132 db attenuation range. This feature also allows insertion of the often used 3 db or 6 db level points by a single switch throw, eliminating the mechanics of inserting individual pads or the need to go thru a time consuming rotary step cycle.

Nine individual attenuation levels of 30, 30, 30, 20, 10, 6, 3, 2, and 1 db are controlled by finger-operated, spring-loaded, slide switches. This unique arrangement consists of a complete coaxial system including coaxial input, coaxial output, individual coaxial line segments and T-pads. Each section is constructed of teflon and air dielectrics exclusively, with contacts of fine silver, insuring precision surfaces throughout. The entire pad compartment utilizes a simple engage-disengage method for ease of operation and guaranteed lock-in-place mechanical and electrical stability. Each individually-switched step is isolated in a broad-tuned, shielded compartment providing both superb accuracy and response over the specified range.

Performance characteristics rivalling those of fixed coaxial pads feature accurate calibration, flat frequency response and low VSWR at a fraction of the cost of comparable range units. Overall accuracies of ±2% up to 2 GHz and ±5% of 4 GHz are typical in the 6 — 132 db attenuation region. VSWR's of 1.10 to 1 GHz and 1.5 to 4 GHz are top limits. The Model 461A also useful up to 7 GHz with accuracies of the 10 db increments (0-120 db) typically better than ±10%. The entire compact package is only 9⅝" x 1⅝" including type N connectors. Connection of nine coaxial pads of the same values would result in a cumbersome attenuator at least twice as long. This model has been designed for bench top operation but may be panel mounted if desired.

SPECIFICATIONS

FREQUENCY RANGE:	DC to 4 GHz
ATTENUATION STEPS: (DB)	9 Steps 1, 2, 3, 6, 10, 20, 30, 30, 30
CONTROLS:	Slide Switches
TYPICAL OVERALL ACCURACY (±):	
DC to .5 GHz	± (1% ± .1) db
.5 to 1 GHz	± (1% ± .3) db
1 to 2 GHz	± (2% ± .3) db
2 to 4 GHz	± (2% ± .3) db
MAXIMUM VSWR:	
DC to 1 GHz	1.1:1
1 to 2 GHz	1.25:1
2 to 4 GHz	1.5:1
TYPICAL INSERTION LOSS:	At 1 GHz .2 db At 2 GHz .3 db At 3 GHz .5 db At 4 GHz .5 db
POWER (Watts):	1
DIMENSIONS:	8⅜" x 2⅜" x 1⅝", plus connectors.
WEIGHT:	2.5 lbs.
PRICE:	$295.00

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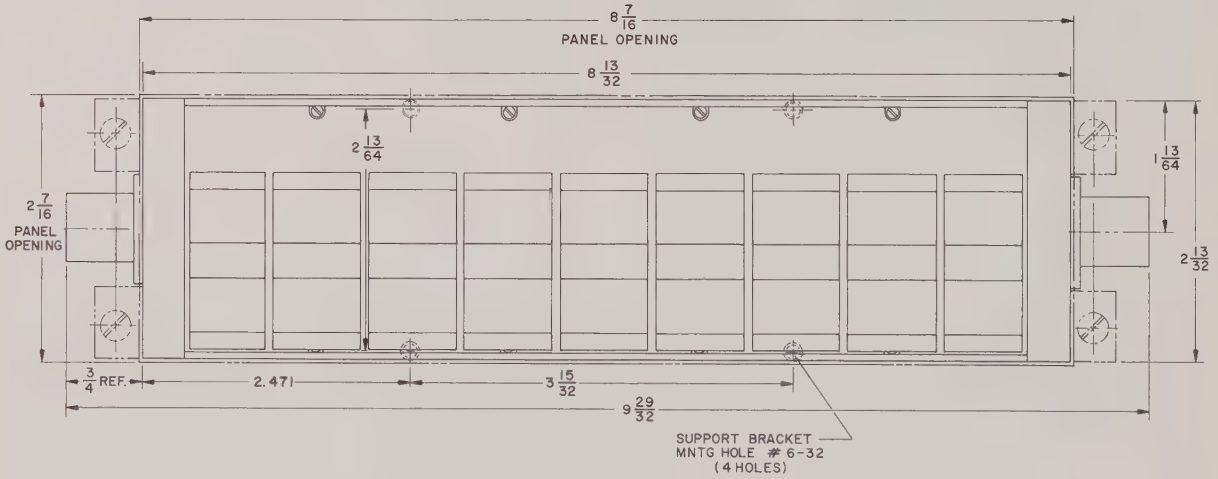
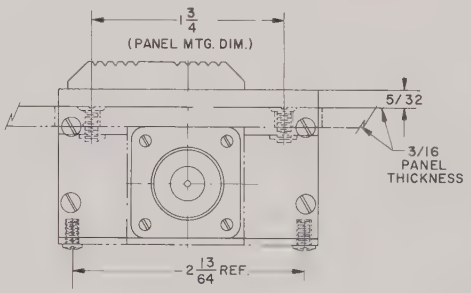
Maple Avenue • Pine Brook, New Jersey 07058

MODEL 461A COAXIAL ATTENUATOR





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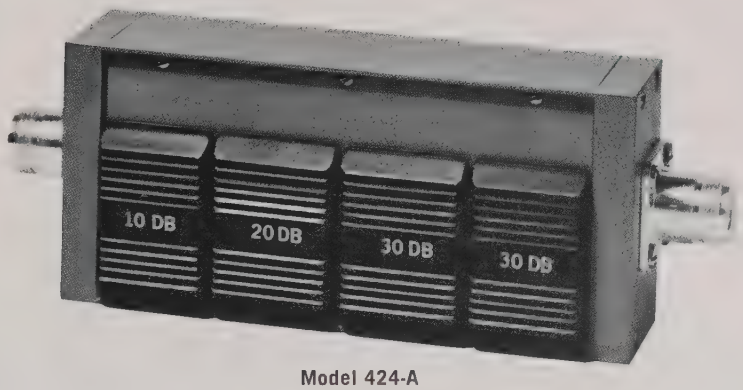
KAY NEW

DC-6GHz COAXIAL ATTENUATOR

TECHNICAL DATA **NOVEMBER, 1968**



Model 424-A

IN-LINE MICROWAVE ATTENUATOR

A new, coaxial, in-line attenuator has recently been introduced by Kay to span the DC - 6 GHz range. Developed from Kay's precision VHF-UHF attenuators, the new Model 424-A provides any combination of 10 db stepped increments over a wide 90 db attenuation range. This feature allows insertion of attenuation by a single switch throw, eliminating the mechanics of inserting individual pads or the need to go thru a time-consuming rotary step cycle.

The four individual attenuation levels are controlled by finger-operated, spring-loaded, slide switches. This unique arrangement consists of a complete coaxial system including coaxial input and output, individual coaxial line segments and T pads. Each section is constructed of teflon and air dielectrics exclusively, with contacts of fine silver, insuring precision surfaces throughout. The entire pad compartment utilizes a simple engage-disengage method for ease of operation and guaranteed locked-in-place mechanical and electrical stability. Each individually-switched step is isolated in a broad-tuned shielded compartment providing both superb accuracy and response over the specified range.

Performance characteristics rivalling those of fixed coaxial pads feature accurate calibration, flat frequency response and low VSWR at a fraction of the cost of comparable range units. The entire compact package is only 4¼" x 2$^{13}/_{32}$" x 1⅝", excluding type N connectors. Connection of four coaxial pads of the same values would result in a cumbersome attenuator at least twice as long. This model has been designated for bench top operation but may be panel mounted if desired.

SPECIFICATIONS

FREQUENCY RANGE:	DC - 6 GHz		
ATTENUATION RANGE:	0 - 90 db in 10 db steps		
ATTENUATION STEPS:	10, 20, 30, 30 db		
TYPICAL OVERALL ACCURACY:	1% ±.2 db 2% ±.2 db 2% ±.5 db	DC to 1 GHz 2 - 4 GHz 4 - 6 GHz	
IMPEDANCE:	50 ohms		
MAXIMUM VSWR:	1.15:1 to 1 GHz 1.3:1 to 4 GHz 1.5:1 to 6 GHz		
INSERTION LOSS:	<.2 db at 1 GHz <.3 db at 4 GHz <.5 db at 6 GHz		
POWER CAPABILITY:	1 watt		
PEAK POWER HANDLING:	1 KW		
PRICE:	$195.00		

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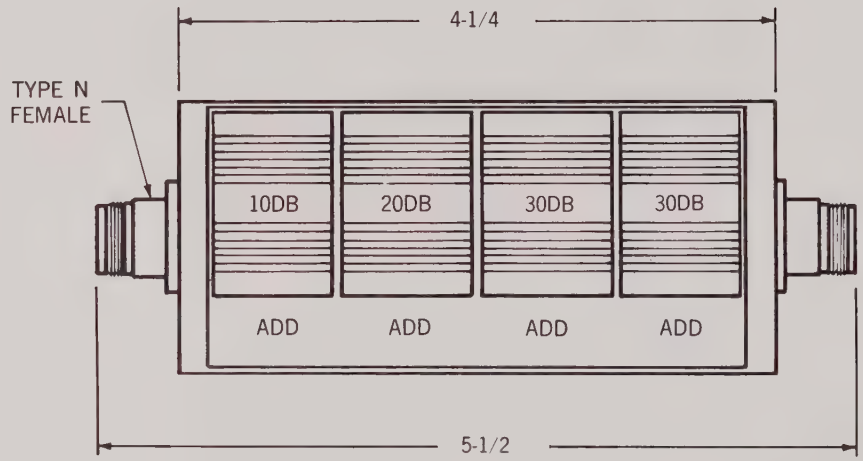
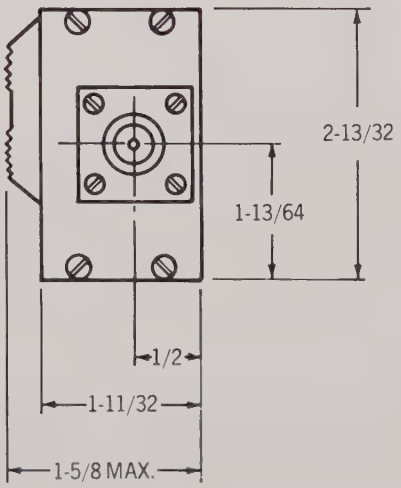
MODEL 424A COAXIAL ATTENUATOR

The Model 424 coaxial attenuator has been designed primarily for bench-top operation. However, a mounting kit is available for panel mount applications. Contact your nearest Kay office for complete information.





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KAY **NEW**

DC - 500 MHz REMOTE CONTROL ATTENUATOR

TECHNICAL DATA

SEPTEMBER, 1969

NEW REMOTE CONTROL ATTENUATOR

Model 4355

The Model 4355 fills the need for a miniature attenuator which occupies a minimum of space in a system, may be remotely controlled or programmed, and requires low voltage and power for operation.

The use of advanced packaging techniques has resulted in a very small, lightweight unit, suitable for inclusion in test set-ups, production systems, etc.

The attenuator features highly accurate attenuation over the DC to 500 MHz range. Low level, coded connections are available for the use of remote control or BCD input signals. New levels of attenuation are selected in 1 ms.

The superior operating characteristics of the Model 4355 are achieved through the use of reed switch controlled miniature attenuator segments. Low maximum error and insertion loss are maintained over the entire operating frequency range. OSM 215 connectors are standard.

SPECIFICATIONS

ATTENUATOR CHARACTERISTICS:

FREQUENCY RANGE:	DC — 500 MHz
ATTENUATION RANGE:	0 - 60 db in 10 db steps
TYPICAL OVERALL ACCURACY:	±1% to 100 MHz ±.2 db ±1% to 250 MHz ±.3 db ±2% to 500 MHz
TYPICAL INSERTION LOSS:	.3 db at 100 MHz .4 db at 250 MHz .85 db at 500 MHz
VSWR:	1.25:1 to 500 MHz
SWITCHING SPEED:	1 ms
POWER CAPABILITIES:	½ w Avg. at 40°C 1 w peak
OPERATING TEMPERATURE RANGE:	—20 to +85°
STORAGE TEMPERATURE RANGE:	—40 to +125°C

CONTROL REQUIREMENTS:

POWER:	5 V at 400 ma (max.)
LINE WEIGHT:	10, 20, 30
CONTROL:	2 wire plus common (contact closure)

GENERAL:

CONNECTORS:	OSM 215
CONSTRUCTION:	Painted aluminum
DIMENSIONS:	Attenuator: 2″ wide x 3⅝″ long x 1⅛″ high Control Unit: 1¾″ x 3-7/16″ x 2-11/16″
WEIGHT:	Attenuator: 6 ozs. Control Unit: 1 lb. 4 oz.

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INTER OFFICE DATA

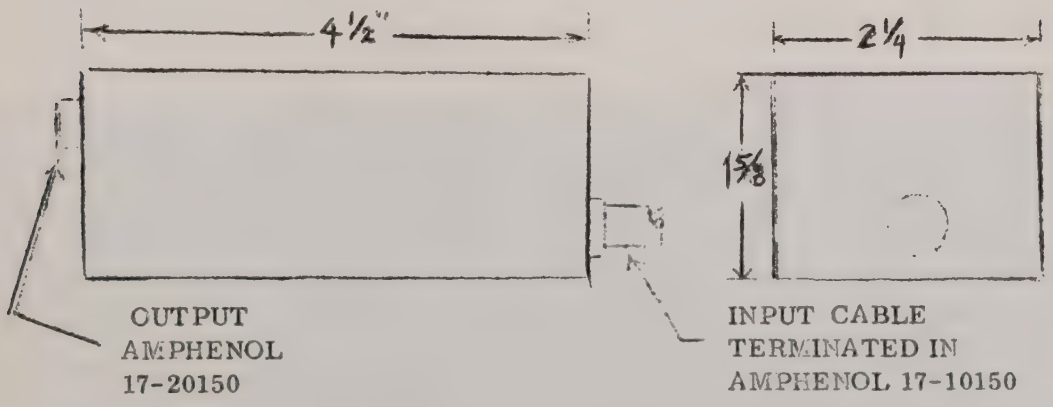
4490 LOGIC ADAPTER

The new model 4490 Logic Adapter, is a solid-state control unit enabling the Kay Programmable Attenuators to operate directly from voltage levels.

A constant d-c level between two and five volts, will hold the attenuator step in the "ON" position. Between zero and one volts, the attenuator step will remain in the "OFF" position. The control unit obtains its operating potentials directly from the Programmable Attenuator.

SPECIFICATIONS

Attenuation "ON" levels	2 to 5 volts dc.
Attenuation "OFF" levels:	0 to 1 volt dc.
Input Impedance:	1000 Ω or less.



KAY **NEW**

DC-1.3GHz PROGRAMMABLE ATTENUATOR

TECHNICAL DATA **NOVEMBER, 1968**

DC-1300 MHz PROGRAMMABLE ATTENUATOR

An all-new Model 4430B has recently been added to Kay Electric Company's line of precision attenuators. The 4430B has been designed to provide highly accurate, fixed increments of attenuation, which may be switched from a remote position or be controlled by BCD signals. "0" level corresponds to open circuits; "1" level corresponds to short circuit.

Unlike other units of its kind this new unit features programmability in a small, light weight package suitable for inclusion in any test equipment or for bench-top operation. The 4430B allows up to 135 DB of attenuation (119 DB when switched manually) in precise 1 DB steps over the DC-1300 MHz range. Attenuation steps are controlled by Kay's proven miniature teflon toggle switches.

A thumb switch - direct reading in DB - arrangement is provided to remotely control the attenuation levels. In addition, nine low-level, coded connections are available for programming via 1248: 1236 BCD input signals. New attenuation levels may be set in less than 20 ms.

The entire package is only 2" x 4½" x 5⅛" and includes TNC type connectors. The 4430B weighs only 2 lbs.

SPECIFICATIONS

FREQUENCY RANGE:	DC to 1.3 GHz
ATTENUATION RANGE:	0 - 135 DB in 1.0 DB steps
TYPICAL OVERALL ACCURACY:	±1.0 DB DC to 0.5 GHz ±1.5 DB 0.5 to 1.0 GHz
INPUT AND OUTPUT IMPEDANCE:	50Ω
MAXIMUM VSWR:	1.2:1 DC to 0.5 GHz 1.4:1 0.5 to 1.0 GHz
INSERTION LOSS:	< 0.2 DC to 0.25 GHz < 0.25 0.25 to 0.5 GHz < 0.7 0.5 to 1.0 GHz
SWITCHING SPEED:	< 20 ms for single step < 150 ms for complete attenuation
LINE WEIGHTINGS:	1248:1236
CONTROL LOGIC REQ'D:	9 BCD (18 ma) plus common
POWER CAPABILITY:	1 watt
POWER REQ'D:	117 V AC, 2 amp to trigger solenoids.
TRANSITORY ATTENUATION:	At no time during switching is the attenuation less than the initial or the final programmed value.
DIMENSIONS:	2" x 4½" x 5⅛"
WEIGHT:	2 lbs.
PRICE:	$645.00

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KAY **NEW**

DC-4GHz PROGRAMMABLE ATTENUATOR

TECHNICAL DATA

OCTOBER, 1968

Model 4461-A

DC-4 GHz PROGRAMMABLE ATTENUATOR

The new Model 4461-A has recently been added to Kay's line of precision attenuators. This model has been designed to provide unique remote-switch or programmable operation of our field-proven 4 GHz coaxial-step models.

Housed in a small, lightweight package the 4461-A is suitable for inclusion in test equipment systems or for bench-top operation.

The device itself features highly accurate attenuation steps covering the DC-4 GHz range. Nine low-level, coded connections are available for remote control and/or programming via 1248:1236 BCD input signals. New attenuation levels may be set in less than 15 ms with total attenuation switched in less than 60 ms.

The superior operating characteristics of this model are maintained through the use of unique, flexible, slide switch controls. The maximum total error and insertion loss is kept at at a minimum. Phase shift in these new models is negligible. Accuracies of the 4461-A are traceable to N.B.S. Type N connectors are standard. It is rated for frequent, but non-continuous operation.

SPECIFICATIONS

FREQUENCY RANGE:	DC-4 GHz
ATTENUATION RANGE:	0 - 132 db in 1 db steps
TYPICAL OVERALL ACCURACY:	2% up to max. of 1 db at 1 GHz 5% up to max. of 5 db at 4 GHz
IMPEDANCE:	50 ohms
MAXIMUM VSWR:	1.15:1 to 1 GHz 1.9:1 to 4 GHz
INSERTION LOSS:	$<$.2 db at 1 GHz $<$.6 db at 4 GHz
SWITCHING SPEED:	$<$15 ms for single step $<$60 ms for full attenuation
LINE WEIGHTINGS:	1248:1236
CONTROL LOGIC REQ'D:	9 BCD Plus common
POWER CAPABILITY:	1 watt
POWER REQUIREMENT:	117 VAC, 2 w/step
PRICE:	$895.00

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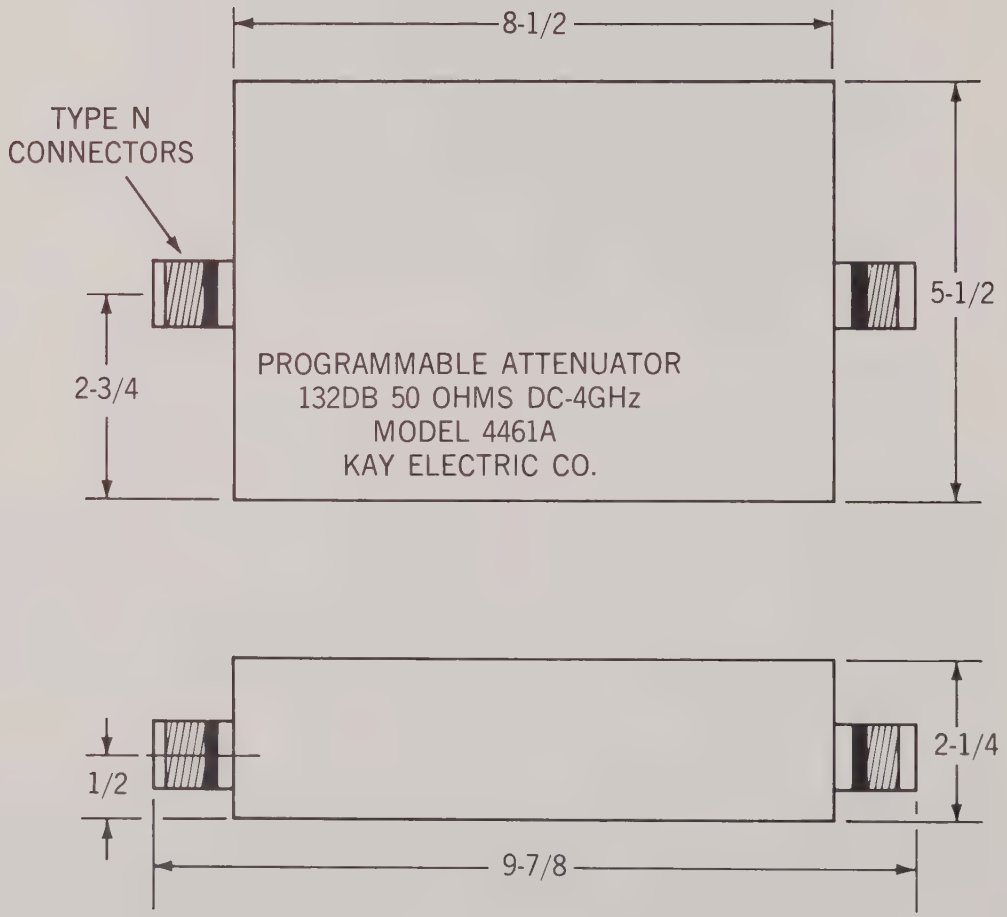
MODEL 4461 PROGRAMMABLE ATTENUATOR



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KAY **NEW**

DC-6GHz PROGRAMMABLE ATTENUATOR

TECHNICAL DATA **NOVEMBER, 1968**

Model 4424-A

DC-6 GHz PROGRAMMABLE ATTENUATOR

The new Model 4424-A has recently been added to Kay's line of precision attenuators. This model has been designed to provide unique remote-switch or programmable operation of our field-proven 6 GHz coaxial-step models.

Housed in a small, lightweight package the 4424-A is suitable for inclusion in test equipment systems or for bench-top operation.

The device itself features highly accurate attenuation steps covering the DC-6 GHz range. Four low-level, coded connections are available for remote control and/or programming via 1248 BCD input signals. New attenuation levels may be set in less than 15 ms with total attenuation switched in less than 30 ms.

The superior operating characteristics of this model are maintained through the use of unique, flexible, slide switch controls. The maximum total error and insertion loss is kept at a minimum. Phase shift in these new models is negligible. Accuracies of the 4424-A are traceable to N.B.S. Type N connectors are standard. It is rated for frequent, but non-continuous operation.

SPECIFICATIONS

FREQUENCY RANGE:	DC-6 GHz
ATTENUATION RANGE:	0 - 90 db in 10 db steps
ATTENUATION STEPS:	10, 20, 30, 30 db
TYPICAL OVERALL ACCURACY:	1% ±.2 db DC to 1 GHz 2% ±.2 db 2 - 4 GHz 2% ±.5 db 4 - 6 GHz
IMPEDANCE:	50 ohms
MAXIMUM VSWR:	1.15:1 to 1 GHz 1.3:1 to 4 GHz 1.5:1 to 6 GHz
INSERTION LOSS:	<.2 db at 1 GHz <.3 db at 4 GHz <.5 db at 6 GHz
SWITCHING SPEED:	<15 ms for single step <30 ms for full attenuation
LINE WEIGHTINGS:	1248
CONTROL LOGIC REQ'D:	4 BCD Plus common
POWER CAPABILITY:	1 watt
PEAK POWER HANDLING:	1 KW
POWER REQUIREMENT:	117 VAC, 2 w/step
PRICE:	$495.00

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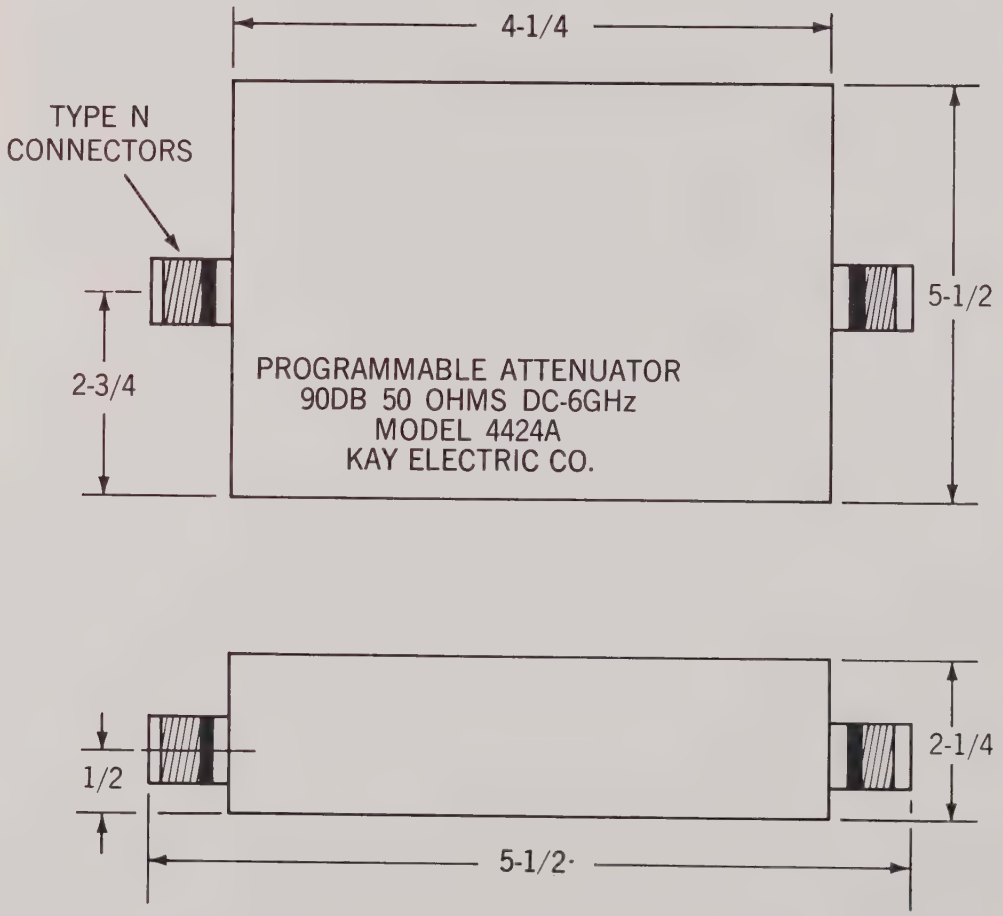
MODEL 4424A PROGRAMMABLE ATTENUATOR



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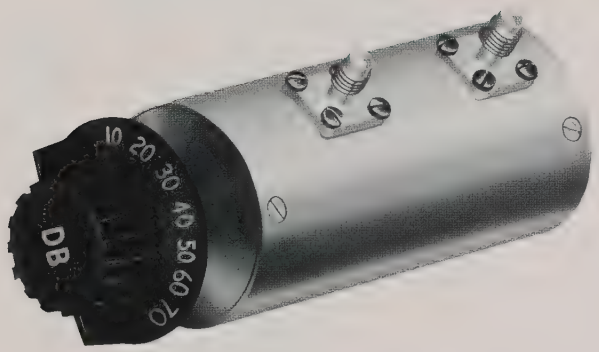
KAY **NEW**

DC-2GHz MINIATURE ROTARY ATTENUATOR

TECHNICAL DATA **OCTOBER 1968**



Model 400-A

The new Model 400-A rotary attenuator has recently been developed to provide excellent attenuation characteristics where space requirements are critical. This device has a range of 0 to 70 db in 10 db steps and operates over the wide DC to 2000 MHz frequency range.

The use of unique new packaging techniques has reduced the 400-A to a really small 1.25" diameter by 2.1" length size. The small size and light weight make the 400-A the ideal solution to aerospace or related applications. This unit is also designed to fit readily into test or production equipments.

The Model 400 employs the precision "pi" pads and broad-tuned shielded cavities used so successfully in the Kay in-line attenuators. The use of printed circuit techniques and the self-cleaning wiper action contacts insure positive high frequency switching and low mechanical stress. Low insertion loss, high accuracy, excellent VSWR and repeatability of measurements, provide for a reliable and inexpensive attenuator over the extended frequency range.

SPECIFICATIONS

FREQUENCY RANGE:	DC TO 2 GHz
ATTENUATION:	0 - 70 db in 10 db steps.
IMPEDANCE:	50 ohms
CONTROLS:	Rotary Knob, 30° between positions.
ACCURACY:	Percent of indicated Value ± 2% at 1 GHz ±4% at 2 GHz
INSERTION LOSS:	0.5 db at 2 GHz
VSWR:	1.15 at 1 GHz 1.25 at 2 GHz
POWER:	.25 w at 40° C. average.
PEAK POWER:	250 w.
OPERATING TEMPERATURE RANGE:	–20 - +125° C.
CONNECTORS:	OSM
SIZE, behind panel:	2 3/16" long, 1.25" dia. plus connectors.
CONSTRUCTION:	Iridited Aluminum Housing.
SHAFT:	Stainless Steel ¼" Dia.
WEIGHT:	2.5 oz.

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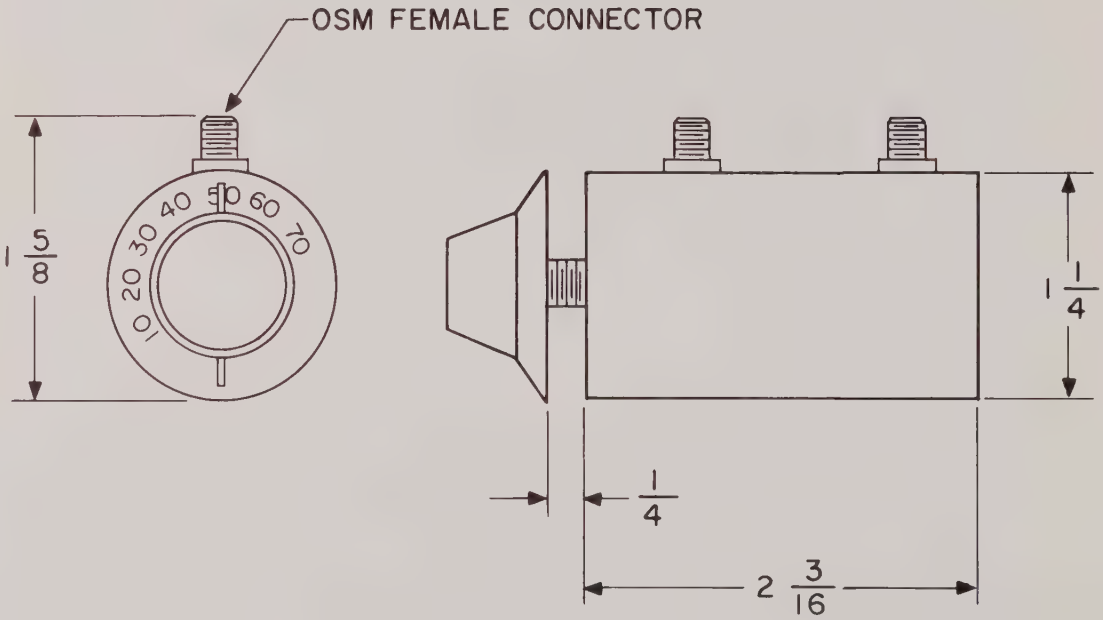
MODEL 400A ROTARY ATTENUATOR



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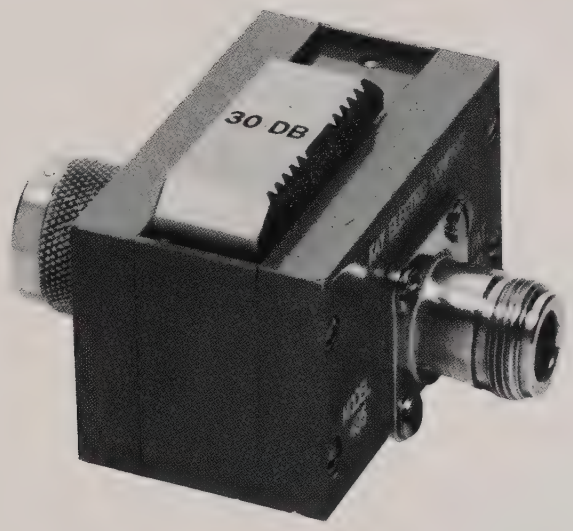
KAY **NEW**

DC-4GHz SWITCHABLE COAXIAL ATTENUATOR PAD

TECHNICAL DATA

OCTOBER 1968



Model 495A

The Model 495-A coaxial attenuator pad spans the DC-4 GHz range and is available in a variety of fixed attenuation values.

This new unit permits the insertion of desired attenuation by a single switch throw, eliminating the mechanics of coupling and decoupling individual pads.

Finger-operated, spring-loaded slide switches control the attenuation level in the Model 495-A. This unique arrangement consists of a complete coaxial system including coaxial input, coaxial output, individual coaxial line segments and T-pads. Each section is constructed of teflon and air dielectrics exclusively, with contacts of fine silver, insuring precision surfaces throughout. The entire pad compartment utilizes a simple engage/disengage method for ease of operation and guaranteed lock-in-place mechanical and electrical stability. Each switchable pad is housed in a broad-tuned, shielded compartment.

This new series rivals the performance of the usual, inflexible coaxial pads and features accurate calibration, flat frequency response and low VSWR at a fraction of the cost of comparable units.

Designed for bench top operation, the Kay Model 495-A can also be panel mounted.

SPECIFICATIONS

IMPEDANCE:	50 ohms	
AVAILABLE IN STEPS OF:	1, 2, 3, 6, 10, 20, and 30 db to 4 GHz 40 db to 1 GHz	
ACCURACY: ±(db)	0 - 6 db	6 - 30 db
DC TO 1 GHz:	.1 db	2% ±.2 db
DC TO 2 GHz:	.2 db	2% ±.2 db
2 GHz TO 3 GHz:	.3 db	3% ±.2 db
3 GHz TO 4 GHz:	.4 db	4% ±.2 db
MAX. VSWR:	DC to 1 GHz	1.15:1
	1 GHz to 2 GHz	1.3:1
	2 GHz to 3 GHz	1.5:1
	3 GHz to 4 GHz	1.9:1
PRICE:	$50.00	

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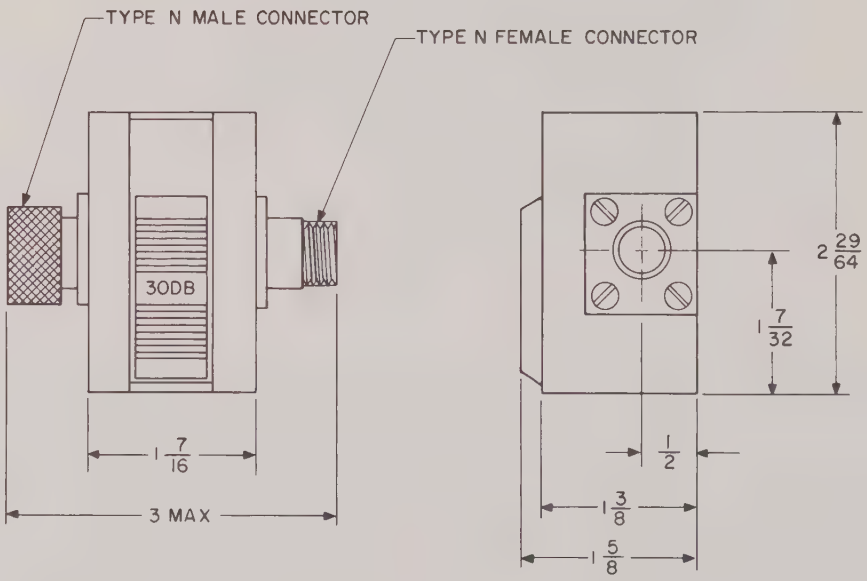
MODEL 495A COAXIAL ATTENUATOR



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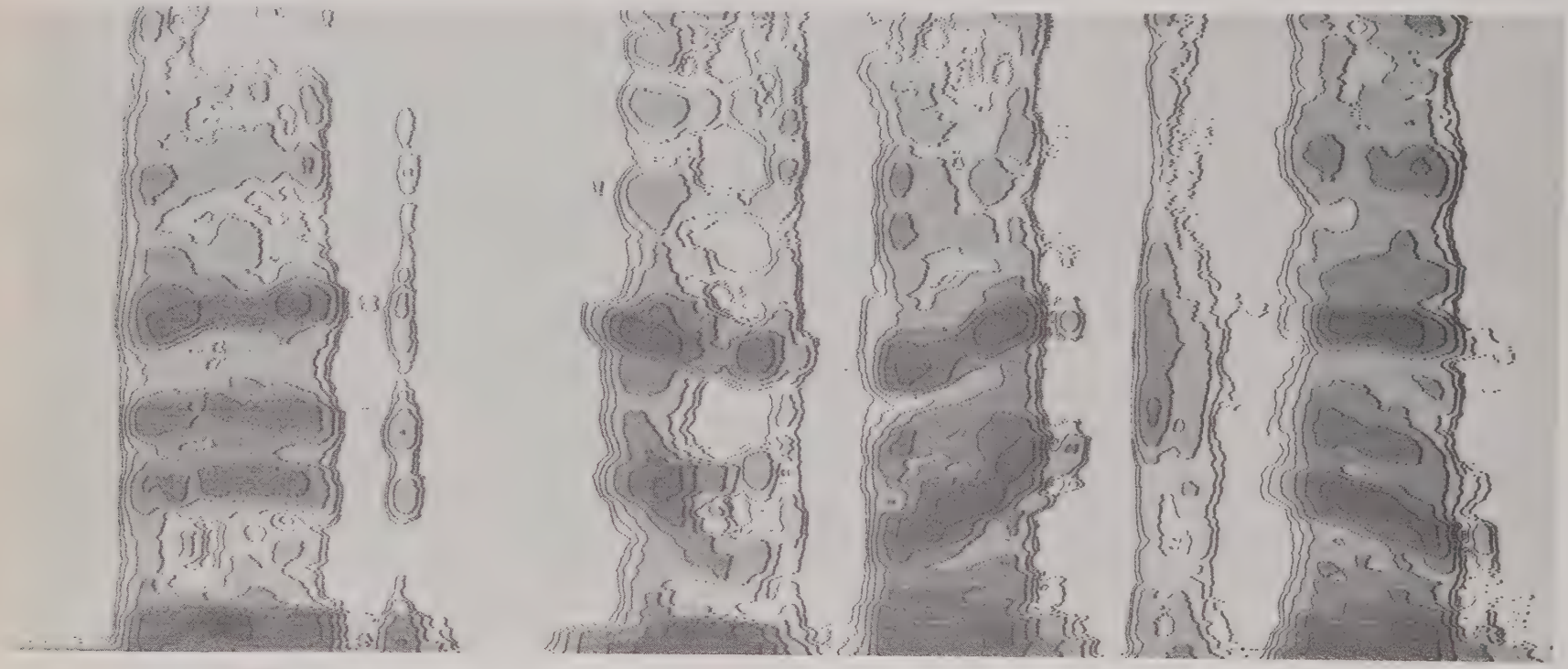
HEARTBEAT CONTOUR DISPLAY

VOICE CONTOUR DISPLAY



DID YOU THANK HIM

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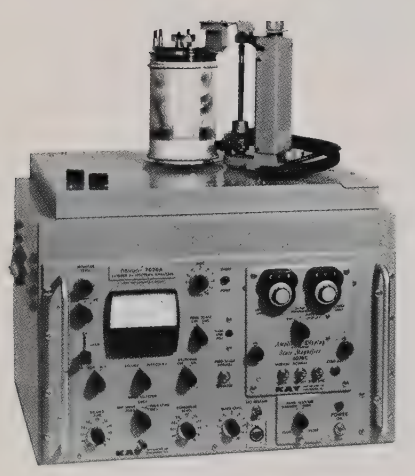
KAY

SOLID STATE AUDIO SPECTRUM ANALYZER

TECHNICAL DATA

OCTOBER, 1968



MODEL 6061-B

- PERMANENT DISPLAYS
- AMPLITUDE-FREQUENCY-TIME
- AMPLITUDE-FREQUENCY
- AMPLITUDE-TIME
- PLUG-IN FILTER
- PLUG-IN ACCESSORIES

SONA-GRAPH 6061-B

The Sona-Graph Model 6061-B, an improved version of the Model 6061-A, features a new, extended frequency range of 16000 Hz. Use of the proven electrical design of the 6061-A with a new, elaborate mechanical drive system allows the unit to cover its range in two switchable bands. Similar to the previous model, the 6061-B provides the familiar Sonagram displays of frequency vs amplitude vs time, amplitude vs frequency and amplitude vs time.

This completely solid-state instrument is housed in a single compact cabinet. The modular construction, utilizing printed circuit boards throughout, makes a more rugged, easy to maintain equipment.

The visual records which contain the analyses of the recorded waves are made on non-photographic, current-sensitive, facsimile-type paper, which is mounted on the drum. The drum and magnetic turntable, being keyed to a common axis, rotate in synchronism. This arrangement provides automatic time synchronization. The record is traced by a stylus which advances upward and at the same time, changes the apparent center frequency of the analyzing bandpass filter. A high-frequency current applied to the stylus is varied in amplitude in proportion to the amount of energy passed by the bandpass filter. The first type of record obtainable displays time on the abscissa, frequency on the ordinate, and intensity as shading between gray and black. The second type of record displays intensity in db vs frequency at as many as six selected times. This display has a dynamic range in intensity of 35 db. The third type of record displays average available amplitude vs time within a dynamic range of 34 db maximum.

VARIABLE FREQUENCY RANGE AND AGC

Further steps to provide flexibility in addition to established characteristics have been taken by providing continuously variable frequency range and AGC circuits. The 85 - 16000 Hz range of the 6061-B may now be magnified thru the use of a plug-in accessory unit to emphasize ANY portion which may be of particular interest. This 0 - 100% expansion, along with the new frequency and time calibration features, allows pinpoint analysis of important waveforms. The 12" drum is also offered for expansion of the time axis display.

A front panel AGC control permits variable compression of 20-40 db down to 10 db, the dynamic range of the Sonagram Paper.

PLUG-IN FILTER

In order to maintain continuity in interpreting audio records via the well known patterns of the Sona-Graph, the original filter bandpass characteristics have been maintained. In order to add new flexibility, the filter assembly has been made as a front panel plug-in unit. It can be interchanged with other filter plug-ins to give special displays, higher resolution, etc.

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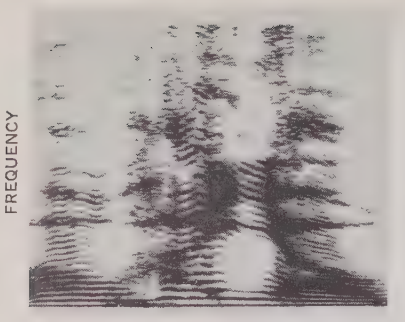
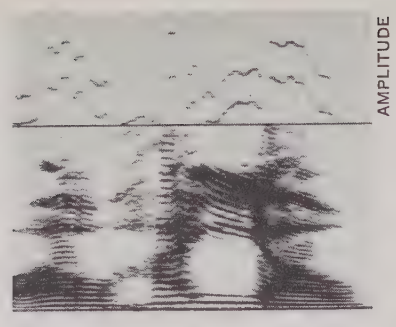
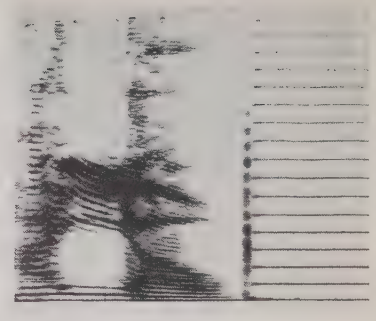
TYPICAL DISPLAYS



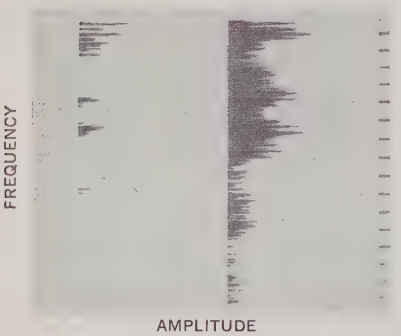
NO. 1 DISPLAY



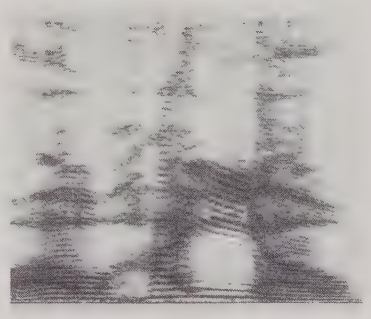
NO. 3 DISPLAY



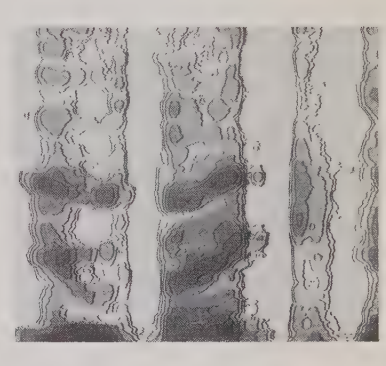
FREQUENCY CALIBRATION



NO. 2 DISPLAY



AGC'D DISPLAY



CONTOUR DISPLAY

SPECIFICATIONS

FREQUENCY RANGE:	85 - 8000 Hz 160 - 16000 Hz
RESPONSE:	±2 db over entire range.
RESOLUTION:	45 and 300 Hz for the 85 - 8000 Hz range 90 and 600 Hz for the 160-16000 Hz range
RECORDING TIME:	Any selected 2.4 second interval: 85 - 8000 Hz range Any selected 1.2 second interval: 160 - 16000 Hz range
RECORDING MEDIUM:	Nickel-cobalt plated turntable
ASPECT RATIO OF SONAGRAM:	4" x 12" with 4 inch drum; 4" x 37.25" with 12 inch drum.
RECORD-REPRODUCE AMPLIFIER CHARACTERISTICS:	Flat, or approx. 13 db High-frequency pre-emphasis.
MICROPHONE:	Altec-Lansing 681-A, dynamic.
INPUT IMPEDANCE:	200 ohms; 600 ohms or 10K ohms, switchable.
POWER SUPPLY:	Input approx. 100 watts, 117 volts (±10%) 60 cps (50 cps operation on request), regulated.
DIMENSIONS:	25" h by 20" w by 18½" d.
ACCESSORIES SUPPLIED:	250 sheets Sonagram recording paper, Type B; Sectioner Micrometer Plate No. 668-A.
AGC RANGE:	Will compress 20 to 40 db down to 10 db.
FREQUENCY CALIBRATION:	Calibration lines at 50, 500, and 1000 Hz intervals.
PRICE:	$3130.00

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KAY NEW

1-16,000 Hz SPECTROGRAPH

TECHNICAL DATA **SEPTEMBER, 1968**

Model 7030-A

- **ANALYZE TO 1 Hz**
- **.56 Hz RESOLUTION**
- **3 MINUTE RECORD TIME**
- **ALL SOLID STATE**

A new solid-state audio spectrum analyzer, the Model 7030-A, offers an 0.56 Hz resolution. This instrument, featuring a new 3 minute recording time, has been primarily focused on the analysis of long duration sonic and subsonic noises and vibrations such as rocket and missile data.

The 7030-A adapts the proven techniques of our Model 7029-A to provide permanent, three-dimensional records of complex signals over the extended range. In addition, it provides eight analyzing bands covering the 1-16000 Hz range, at a variety of sonagram time scales.

This model also permits use of the 6076-C and 6070-A accessory plug-ins to provide a wide variety of analyses. Special resolutions may be obtained through the use of plug-in crystal filters which are interchangeable with the standard, providing an even wider range of widths for more demanding analyses. A stop-start tape recorder adaptation available with other Kay models, is also provided with the 7030-A.

SPECIFICATIONS

FREQUENCY RANGE: 1 Hz to 16 KHz

RECORD TIME:

Range (Hz)	Record Time (sec.)	Resolutions (Hz)
1-100	192.5	.56 & 3.8
4-400	48.1	2.2 & 15.2
5-500	38.4	2.8 & 19.0
10-1000	19.2	5.6 & 37.5
20-2000	9.6	11.2 & 75
40-4000	4.8	22.5 & 300
80-8000	2.4	45 & 300
160-16000	1.2	90 & 600

FREQUENCY CALIBRATION: 50, 500 or 1000 Hz, Switchable

DISPLAYS AVAILABLE: Frequency-Amplitude-Time (conventional)
Frequency-Amplitude-Time (contour)
Amplitude-vs-Frequency
Amplitude-vs-Time

RESPONSE: ±2 db over entire range
AGC RANGE: Variable 20 to 40 down to 10 db
AMPLIFIER CHARACTERISTICS: Flat or 13 db high shape
INPUT IMPEDANCE: 200, 600, or 10,000 ohms, switchable
ANALYSIS TIME: 1.3 Min.
RECORDING MEDIUM: Nickel-cobalt plated turntable
MICROPHONE PROVIDED: Altec-Lansing 681A Dynamic
POWER SUPPLY: 117V, 50/60 Hz, 100 W, Regulated
DIMENSIONS: 25" h x 20" w x 18½" d
PRICE: $4,445.00

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KAY **NEW**

SONAGRAMS TO ABOVE 100 KHZ

TECHNICAL DATA

SEPTEMBER, 1968

Model 6078-A

USED WITH:

- **6061-B, 85-8,000 Hz SONAGRAPH**
- **7029-A, 5-16,000 Hz SONA-GRAPH**
- **7030-A, 1-16,000 Hz VIBRALYZER**

FREQUENCY TRANSLATOR

The 6078-A is designed to accept inputs of up to 107 KHz and convert them into signals compatible with the frequency range of the Kay spectrum analyzers. The application of these high frequency signals to the crystal controlled circuitry of the 6078-A results in an extremely stable, flat signal. The resultant low frequency signals are applied to the analyzer and the familiar 3 dimensional plot is generated.

The Sonagrams produced are directly comparable to the low frequency displays.

This compact, plug-in accessory may be used in the following Kay equipment: 6061-B, 7029-A, and 7030-A. The 6078-A may be used with the Model 6076-C (AMPLITUDE DISPLAY/ SCALE MAGNIFIER) for a magnified analysis of the signal.

SPECIFICATIONS

FREQUENCY RANGE:	16 - 107 KHz
SWITCHED INPUTS:	16 - 29 KHz
	29 - 42 KHz
	42 - 55 KHz
	55 - 68 KHz
	68 - 81 KHz
	81 - 94 KHz
	94 - 107 KHz

OUTPUT FREQUENCY:	3 - 16 KHz
FREQUENCY ACCURACY:	±5 Hz
OUTPUT LEVEL (0 VU INPUT):	Approx. 1 V p/p into 10 K ohms
FLATNESS:	Including analyzer, ±2 db
SPURIOUS OUTPUT:	45 db below 1 V p/p into 10 K ohms
INPUT LEVEL (For 0 VU):	150 MV p/p to 8 V p/p into 10 K ohms
PRICE:	$795.00

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KAY **NEW**

ADDITIONAL CHANNEL FOR SONAGRAPH ANALYSES

TECHNICAL DATA

NOVEMBER, 1968

- SIMULTANEOUS RECORDING OF TWO SEPARATE SIGNALS
- SEPARATE SONAGRAMS ON IDENTICAL TIME BASE

Model 7029ADC

The 7029ADC provides a complete, second recording channel for use with the 6061-B, 7029-A, or 7030-A sound spectrographs. It permits the simultaneous recording of two separate signals and their playback on the same time base. A selector switch on the 7029ADC panel selects output from either the main unit channel or that of the 7029ADC. All the controls of the analyzing system (AGC, reproduce level, calibrator) apply to both signals and can be maintained at the same settings or set for a new configuration as desired. With the use of the frequency invert control on the main unit, the signals can be displayed as mirror frequency patterns on the same sonagram. When individual records are made, the 6077 time mark generator can be used for precise time base identification.

SPECIFICATIONS

FREQUENCY RANGE:	1 Hz to 16 KHz
FREQUENCY CALIBRATION:	50, 500 or 1000 Hz, switchable
DISPLAYS AVAILABLE:	Frequency-Amplitude-Time (conventional) Frequency-Amplitude-Time (contour) Amplitude-vs-Frequency Amplitude-vs-Time
RESPONSE:	±2 db over entire range
AMPLIFIER CHARACTERISTICS:	Flat or 13 db high shape
INPUT IMPEDANCE:	200, 600, or 10,000 ohms, switchable
DIMENSIONS:	10" x 7" x 13"
PRICE:	$650.

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KAY NEW

SONAGRAM FREQUENCY COUNTER

TECHNICAL DATA

FEBRUARY 1969

- SONAGRAM FREQUENCY MONITOR
- FREQUENCY MARKER
- FREQUENCY CALIBRATOR.
- CONTINUOUS, DIGITAL READOUT FOR ALL POINTS ON THE FREQUENCY AXIS.
- COMPATIBLE WITH ALL KAY SOLID-STATE ANALYZERS

An all-new frequency counting module has been designed for use with Kay's solid state line of Audio Spectrum Analyzers. This plug-in, the Model 6079A Sona-Counter, provides a bright digital readout of frequencies as they are being plotted on the Sonagram. This new feature permits monitoring of exact frequencies and facilitates upper and lower range setting of its built-in scale magnifier.

In addition, front-panel control provides an easy, accurate mode of frequency calibration. As the counter follows the frequency trace up its scale, the push of a switch inserts a narrow, easily discernible, marker across the display thus pinpointing areas of importance. At completion of the final plot, the stylus carriage may be returned to primary areas along the display to allow frequency calculation of these points of interest.

The 6079A, functioning as a scale magnifier, offers completely variable frequency ranges. Seven switched bands are available providing a variety of both time and frequency scales.

SPECIFICATIONS

A. INTERNAL COUNTER

1.	**Displayed frequency**	— 10Hz to 16KHz.
2.	**Gate Times**	— 1 sec. or 0.1 sec.
3.	**Accuracy**	— ± 1 count ± power line frequency
4.	**Read Out.**	— three "nixie" tubes + an indicator for next digit.

B. EXTERNAL COUNTER

1.	**Frequency range**	— 10Hz to 100KHz.
2.	**Input**	— 0.1V rms into 1K ohms
3.	**Gate Times**	— 1 sec. or 0.1 sec.
4.	**Accuracy**	— ± count ± power line freq.
5.	**Max. Displayed Freq.**	— 9.99Khz. From 10KHz to 100KHz first digits must be known.

KAY ELECTRIC COMPANY
Maple Avenue • Pine Brook, New Jersey 07058

KAY
ELECTRIC COMPANY

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(201) 227-2000
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(219) 272-2848

West Coast Office
P.O. Box 206
Goleta, Calif. 93017
(805) 967-9316

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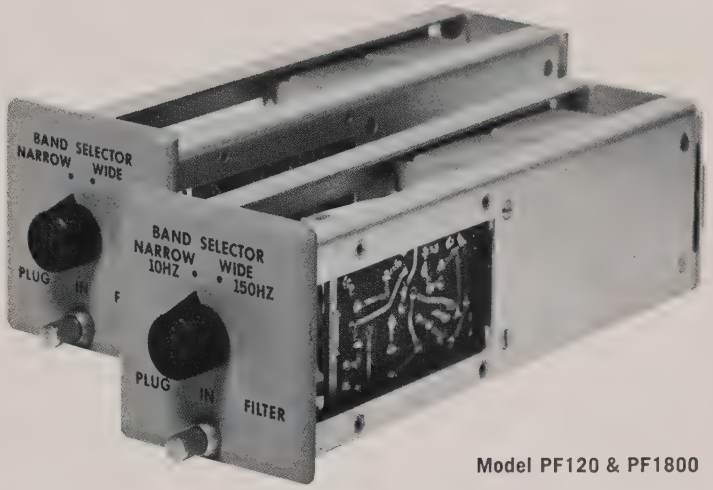
KAY **NEW**

SONAGRAPH FILTER PLUG-INS FOR VARIETY OF RESOLUTIONS

TECHNICAL DATA **NOVEMBER, 1968**

FOR USE WITH KAY MODELS:

- 6061-B
- 7029-A
- 7030-A
- 7050-A



Model PF120 & PF1800

The analyzing filters used in the sound spectrograph largely determine the resolution of the sonagram — frequency resolution and time resolution. These are illustrated in Fig. 1 and Fig. 2 showing the patterns derived from the conventional 45 and 300 cycle filters. The readout desired may vary depending on the sort of signal being analyzed; and on the parameter of most interest for the study being made.

In addition, the transient response of the analyzing filter will influence the pattern made by very fast changing signals. Filters that are too narrow for the application may produce "echoes" in the pattern.

In order to provide optimum selection of filter characteristics, the analyzing filters of the sound spectrographs have been designed as plug-in units, easily interchanged from the front panel of the unit. Filters can be obtained to special characteristics on special order.

There are two bandwidths which appear to be useful for a wide variety of applications and these are offered as standard accessories. These are a 10 Hz unit, useful for high frequency resolution; and a 150 Hz unit, useful for fast-changing signals such as bird calls. They may be ordered separately or combined in one plug-in for maximum flexibility.

SPECIFICATIONS

FREQUENCY RANGE	RESOLUTION (Hz)			
	45 ~	300 ~	10 ~	150 ~
1-100 Hz	.56	3.8	.125	1.87
4-400 Hz	2.2	15.2	.5	7.5
5-500 Hz	2.8	18.75	.625	15.2
10-1000	5.6	37.5	1.25	18.75
20-2000	11.2	75.0	2.5	37.5
40-4000	22.5	150.0	5	75
80-8000	45	300	10	150
160-16000	90	600	20	300
MODEL	STANDARD		PF120	PF1800

PRICE: PF120 — $220.
PF1800 — $220.
Combined PF120 and PF1800 — $310.

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KAY ELEMETRICS CORP
Pine Brook, New Jersey
201-227-2000
TWX-710-734-4347

PRICE SHEET CHANGES
EFFECTIVE DECEMBER 1969

The following prices have been revised as indicated:

141D	$1445.00
615A	2230.00
669A	330.00
695A	2625.00
697A	550.00
730B	2680.00
740A	2825.00
6061B	3285.00
6061BC	3625.00
6070A	995.00
6076C	580.00
6077A	330.00
6078A	835.00
6079A	995.00
6080A	320.00
7029A	4155.00
7029AC	4485.00
7029ADC	685.00
7030A	4670.00
7030AC	4995.00
7050A	4670.00
792A1	840.00
7921A1	150.00

PF 120	$230.00	
PF 1800	230.00	
PF 120 / 1800	325.00	
1541 Standard Recorder		$495.00
1541 With Slides		605.00
PM 7650	$150.00	
Pulse Markers		$ 35.00
Standard Set (Includes Markers at 2, 5, 10, 15, 20, 40, 60, and 80 MHz)		295.00
PM 7660	$150.00	
Single Birdie Markers		$ 45.00
Harmonic Comb. Markers		55.00
Standard Set (Includes multiples of 1, 2, 5, 10, and 20 MHz)		375.00

KAY INSTRUMENTS

PRICE SCHEDULE AUGUST 1969

INSTRUMENT PRICE LIST

CAT. NO.	PRICE	CAT. NO.	PRICE	CAT. NO.	PRICE	CAT. NO.	PRICE	CAT. NO.	PRICE
100A	$ 610.00	**385A**	$ 845.00*	**792A**	$ 740.00n	**1025B**	$ 845.00	**6076C**	$ 525.00
101A	2495.00s,m	**386A**	980.00*	**792AFE**	945.00n	**1483B**	495.00**	**6077A**	315.00
110A	665.00	**386AN**	1295.00	**860H**	525.00s	**1484A**	575.00†	**6078A**	795.00
111A	665.00	**386AR**	1325.00	**865A**	1010.00*	**1500C**	690.00s,m	**6079A**	950.00
121C	950.00s,m†	**391A**	995.00	**866A**	1010.00*	**1522A**	4900.00	**7029A**	3950.00
141D	1375.00*	**403A**	400.00	**932A**	875.00*	**2500**	795.00	**7029AC**	4270.00
150B	630.00	**420A**	475.00	**932B**	875.00*	**2600A**	495.00††	**7029ADC**	650.00
154C	950.00m	**615A**	2125.00	**935C**	1375.00*	**3092A**	635.00	**7030A**	4445.00
159C	950.00m	**669**	315.00	**965A**	105.00	**5070B**	930.00	**7030AC**	4765.00
240B	400.00	**695**	2500.00	**990A**	395.00	**5070B1**	1295.00	**7050A**	4445.00
255B	260.00	**697**	525.00	**997A**	35.00	**6061B**	3130.00	**7630A**	450.00*
361C	895.00	**730B**	2550.00	**1022A**	525.00	**6061BC**	3450.00	**n-7921A**	100.00
370A	525.00*	**740A**	2700.00	**1023A**	320.00	**6070A**	950.00	**8040A**	210.00
380A	525.00	**780A**	840.00	**1024A**	315.00			**8050A**	260.00

s—SWEEP PLUG-INS

FOR MODEL 101A:

K10237	$295.00	**K10325**	$325.00	**K10327**	$295.00
K10324	245.00	**K10326**	295.00	**K10328**	295.00

FOR MODEL 121C:

P120A	$1100.00	**P123A**	$ 425.00	**P126A**	$1275.00
P121A	525.00	**P124A**	425.00	**P127A**	1495.00
P122B	400.00	**P125A**	1150.00	**P128A**	1490.00

FOR 860H AND 1500C:

PC120A	$1100.00	**PC128A**	$1490.00	**PC154A**	$630.00
PC123A	425.00	**PC130F**	400.00	**PC855B**	630.00
PC125A	1150.00	**PC141B**	505.00	**PC856B**	630.00
PC126A	1275.00	**PC142B**	505.00	**PC860E**	595.00
PC127A	1495.00	**PC152B**	400.00	**PC867B**	215.00

*pulse markers to order each $17.00
**single frequency birdie markers to order each $35.00
or harmonic birdie markers to order each $45.00
†optional rotary attenuator available at $90.00
††with detached power supply — $545.00

n—noise source required, see above
s—sweep plug-in required, see above
m—marker plug-in available, see above

m—MARKER PLUG-INS

FOR MODEL 101A:

PM10 $325.00

PM7650 $100.00 pulse markers to order, each.....$24.00
standard set includes PM7650 with markers at 2, 5, 10, 15, 20, 40, 60, and 80 MHz.....200.00

PM7660 $105.00
single frequency birdie markers to order, each.....35.00
harmonic birdie markers to order, each.....45.00
standard set includes PM7660 with harmonic markers at 1, 2, 5, 10, and 20 MHz.....275.00

FOR MODEL 121C:

1, 10, 100 MHz harmonic marker module.....$155.00

FOR MODELS 154C & 159C:

PM7650 as above **PM7670** $295.00
PM7660 as above

FOR MODEL 1500C:

PCM861A	$160.00**	**PCM7632A**	160.00*
PCM932B	160.00*	**PCM7670A**	295.00
PCM7631A	160.00*		

PRICES SHOWN ARE FOB Pine Brook, N. J.

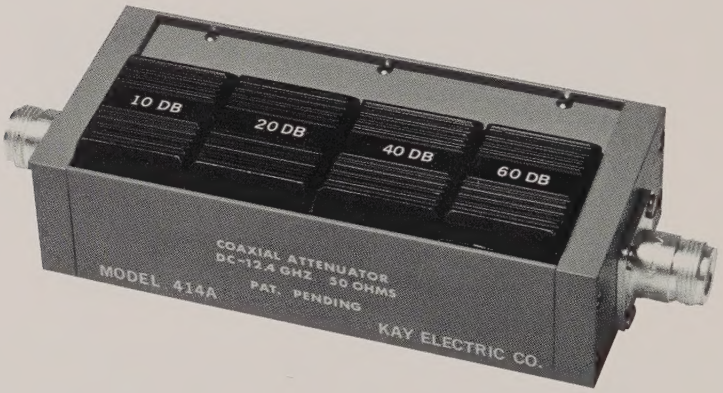
KAY WARRANTY

Each new instrument manufactured and/or sold by us is warranted to be free from defects in material and workmanship. Our responsibility is limited to repairing (or replacing) any instrument or part thereof (except tubes) for a period of one year when, in our opinion, the repair or replacement is covered by this warranty. Tubes are warranted for a period of three months from date of shipment against failure because of defective

KAY

PRICE SCHEDULE AUGUST 1969

ATTENUATORS



STANDARD ATTENUATOR PRICES

CAT NO.	PRICE
400A	$120.00
401A	120.00
402A	120.00
404A	120.00
405A	120.00
406A	120.00
407A	120.00
408A	120.00
409A	120.00
411A	95.00†
412A	165.00
413A	230.00
414A	295.00
430B	85.00
431C	80.00
432D	99.00
433A	265.00
434A	240.00
435A	90.00
436A	90.00
437A	145.00
438A	90.00
439A	109.00
440B	85.00
441B	80.00
442D	99.00

†$99.00 for non-std. values

CAT. NO.	PRICE
443A	$265.00
444A	240.00
445A	90.00
446A	90.00
447A	145.00
449A	109.00
450A	85.00
451B	80.00
452C	99.00
453A	265.00
454A	240.00
457A	145.00
459A	109.00
460A	145.00
461A	295.00
464A	150.00
467A	150.00
470A	145.00
480A	145.00
495A	50.00
1/432C	99.00
1/435A	90.00
1/442C	99.00
1/452C	99.00
4424A	495.00
4430B	645.00
4461A	895.00

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